School Shop

vol. II no. 5
January, 1943

Post-War Industrial Education
by Arthur B. Mays

Organizing a Radio Course
by John C. Sampson

Is Your War Training Geared to Industry's Needs?
by George H. Parkes

Tap and Die Toolboard
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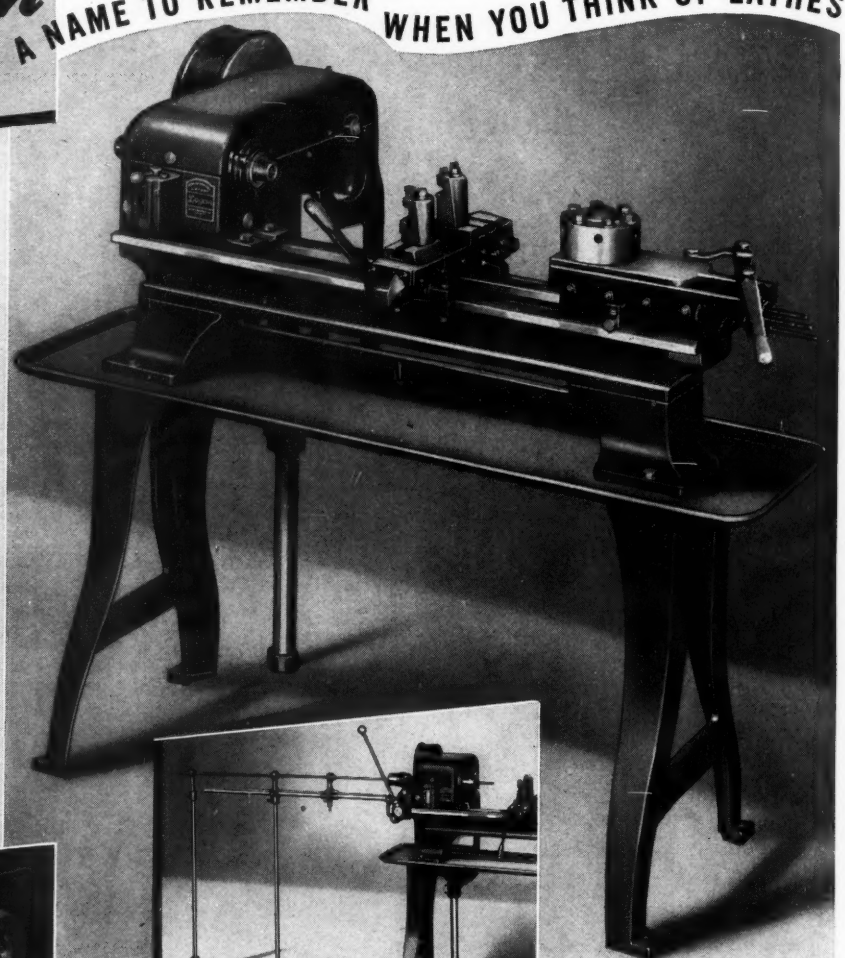

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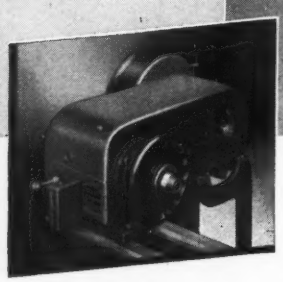

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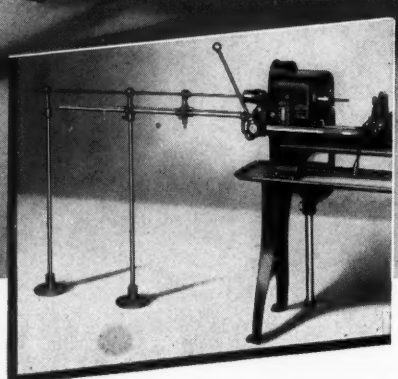

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1. ***"Model Yacht Building as a Shop Activity."***
2. ***"Aeromodeling in Aviation Education."***
3. ***"Motivation in Teaching Industrial Arts."***
4. ***Shop-Tested Projects.***
5. ***And these regular features: Instructional Resources; Shop Training for Victory; Question of the Month; Washington Letter; and others.***

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, Box 100, Ann Arbor, Michigan. Subscription rates to libraries and institutions, $2.00 a year; Foreign and Canadian, $3.00 a year. 25 cents a copy. Printed in the U. S. A. **Copyright, 1943, by Lawrence W. Prakken.** **Advertising Representatives: Eastern—Macintyre & Simpson, Room 1837, 101 Park Ave., New York City, Lexington 2-3783; Mid-West—Macintyre & Simpson, 75 East Wacker Drive, Chicago, Central 1715, and 1900 Euclid Avenue, Cleveland, Ohio, Cherry 1501.**

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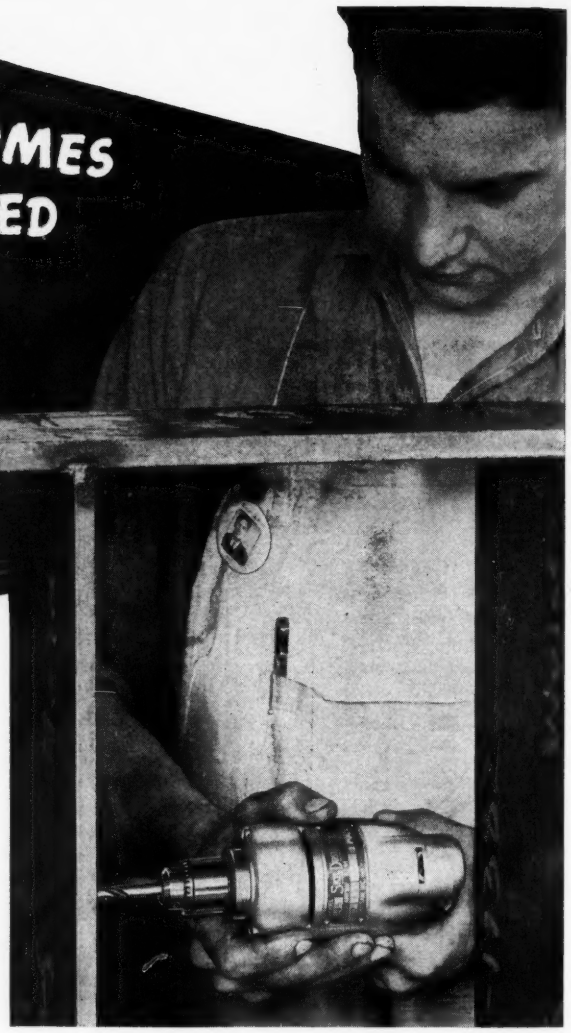

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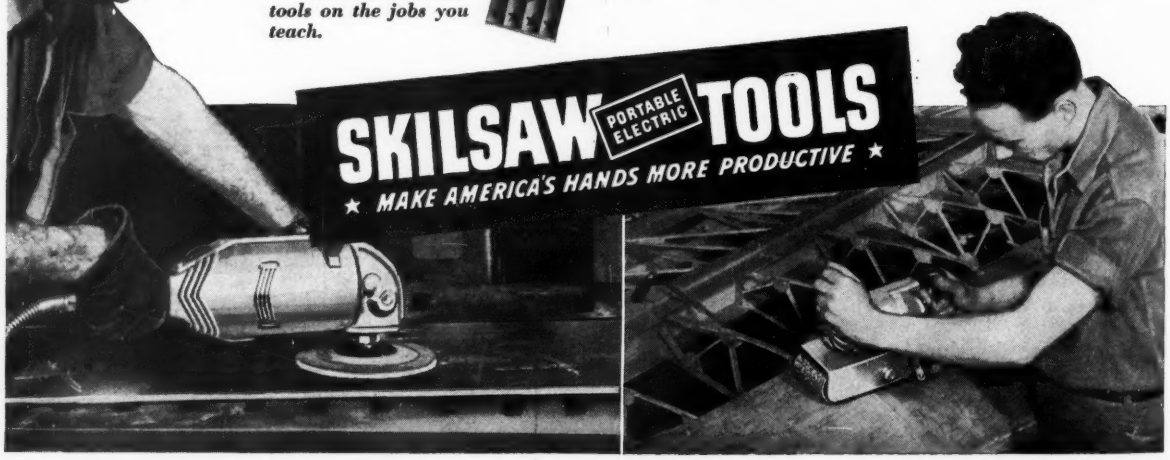
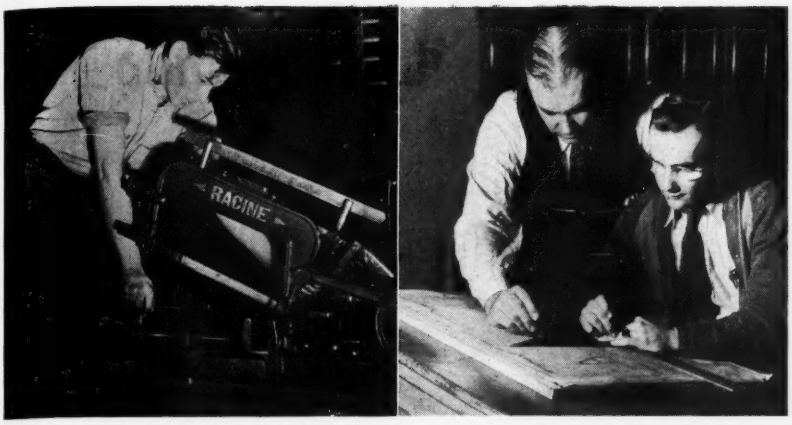




"Where can clear, precise, logical thinking be better developed into habits than in the shops and drafting rooms?"

Industrial Education

IN THE POST-WAR ERA

BY *Arthur B. Mays*

The war and post-war period herald a new era for industrial education, believes Arthur B. Mays, Professor of Industrial Education at the University of Illinois, who looks forward to many new developments such as area vocational schools as well as increased utilization of present-day programs.

ALL great wars throw into sharp relief the whole pattern of values held by a people. What is believed concerning God and country, life and death, love and hate, government, justice, economic and social practices, and particularly education, is brought into acute focus. Questions arise which have been ignored for generations or the answers to which have been accepted without analysis. Such questions are anxiously considered and familiar institutions and procedures are critically examined, often for the first time. War places unusual strain on all social institutions, and revolutionary modifications usually result.

The effect of war on education is a study of vital importance to all educators, but particularly to those engaged in the work of industrial education. This is true because war always supplies extraordinary stimulation to industry. Every aspect of industry is intensified, modified in character, and enormously expanded. Old, inefficient practices are quickly eliminated, new production methods are rapidly evolved, and both the weaknesses and strengths of previous training practices are made strikingly evident. The war between the states hastened the establishment of agricultural and mechanical colleges and greatly stimulated the whole field of engineering and technical education. The first World War likewise speeded the passage of the Smith-Hughes law and brought about the establishment of a national scheme of vocational education of secondary grade which had been needed since the Civil War. There is strong evidence for the belief that another long step forward in industrial education is certain to follow the present great war. Industrial education in both its major divisions of vocational-industrial education and industrial arts has experienced a phenomenal development during the past 25 years. Each division has mutually benefited from the growth of the other and today both are firmly established in the schools, and both are contributing heavily to the war effort. Millions of citizens who were but dimly aware of the importance of industrial education as a vital aspect of public education in an industrial country are now keenly alive to the importance of this part of the education of every young citizen.

The speed and efficiency with which the vocational-industrial classes of high schools throughout the Nation swung into the war training program was astonishing to officials of the government. Within a period of two weeks after the call came to the schools, many industrial education departments were running 24 hours per day. At this time more than 500 departments are on a 24-hour basis. More than three million war workers have been trained in the public school shops and classes since the call came. Obviously no such response could have resulted from a field of instruction which was not vigorous and effective before the emergency. The development of vocational-industrial education during the past 25 years constitutes one of the most remarkable advances in secondary education in the entire history of education.

With the whole civilized world in dire need of machines, tools, clothing, automobiles, railroad equipment, and almost every known product of industry and with new wants which wartime inventions and developments are sure to create, there will be the greatest demand after the war for trained industrial workers the world has ever experienced. It seems clear, therefore, that every known type of vocational-industrial training class and program which has been tested by experience and found effective will be enormously expanded in the post-war era. This will doubtless mean great development of part-time classes, evening schools, factory schools and training programs, apprenticeship, foreman training classes, and full-time trade schools and classes. Every factor in the present situation seems to point to such an enlargement of offerings. But that will not suffice. There are still thousands of communities which can have none of these opportunities for the industrial education of their youth and young adults. Hence many students of industrial education are calling for a new type of vocational school which will serve larger areas than a community or town. It is thought by many that one of the most significant effects of the war effort on industrial education will be the development in the post-war era of the Area Vocational School. In any case all factors now apparent indicate the expansion of vocational-industrial education in the United States on an unprecedented scale.

What appear to be the most probable developments in the other great division of industrial education, namely, industrial arts? There has never been a time in the history of industrial arts when it was more generally accepted by both educators and taxpayers as a necessary aspect of the education of all boys and girls. Since industry is one of the most potent and significant factors in the modern environment, the school subject which represents and interprets industry to youth is obviously one of the most important phases of school instruction. Not only is that true, but modern psychology and educational philosophy have increasingly confirmed the educative values of the experiences provided by industrial arts, which its leaders

have claimed for it throughout its history. The same elements in the educational system which formerly opposed the introduction and expansion of industrial arts are now among its strongest advocates. The men who have lived through this remarkable transition have difficulty in believing what they see. It would have required an incurable optimist 40 years ago to predict the present status of industrial arts in the public schools. As a necessary feature of the general education of all citizens of this industrial nation, industrial arts has found a secure place in the schools and in public esteem.

The development of vocational-industrial education of recent years, however, has demonstrated what Dr. Woodward argued in 1880 that industrial arts, besides being an instrument of general education, is also a most important foundation training for vocational education. Hence all careful students of industrial education now recognize that industrial arts plays a dual role, namely, as an important factor in both general and vocational industrial education. In a sense industrial arts occupies the unique position of holding to general education with one hand and to vocational education with the other, and neither will release its hold nor can industrial arts afford to take its hand from either. This fact makes it one of the most interesting and significant phases of modern education.

What, then, may one expect to be the status and character of industrial arts in the post-war era? Briefly, the probabilities are that: (1) since industrial arts has never for one moment ceased to grow since 1880 it will continue to grow rapidly after the war. (2) The urgent needs of vocational life point clearly to a greater emphasis upon the *character-developing* features of industrial arts. Few school subjects offer such unlimited opportunities for the development of honesty in work, perseverance, mutual help and good citizenship. Teachers can and *must* capitalize more than they ever have on these opportunities. (3) More emphasis will be placed on the *intellectual-development* values of industrial arts. Where in the school is it easier to teach youth to analyze tasks before undertaking them? Where can clear, precise, logical thinking be better developed into habits than in the shops and drafting rooms? There will be great need and urgency for such habits in the post-war world. (4) Industrial arts faces the task of training youth for life and work in a world

(Continued on page 7)

War Problems

DISCUSSED AT AVA TOLEDO CONVENTION

Fred A. Smith, State Director of Vocational Education for Arkansas and new President of the AVA.

WITH members present from every state in the Union, and with representatives of the U. S. Army, the Navy, the War Manpower Commission, war industries, and federal and state officials participating, the War Work Training Conference of the American Vocational Association was held in Toledo, Ohio, December 2 to 5.

About 1200 A. V. A. members were registered, and total attendance was estimated at 1500 by L. H. Dennis, A. V. A. Executive Secretary.

Streamlined to meet the fast moving pace of war production, all general and sectional meetings not only assumed a wartime march tempo but provided inspiration and ideas for greater efficiency and effectiveness in war job training to the point where substantial advancements may be expected in the year ahead.

Teacher shortages, teacher training needs, and post-war curriculum requirements occupied the major attention of the industrial arts education section. The trade and industrial section devoted most time to various phases of the national program of Vocational Training for War Production Workers.

These deliberations were climaxed in a resolution adopted by the House of Delegates which requested that "the United States Office of Education be urged to use every means at its command to assist the vocational schools of the nation in operating to the fullest extent possible for 12 months of the year."

This action, doubtless growing from the year-round, 7-day week, 24-hour day program for the training of war production workers, was unanimous and places the A.V.A. on record as the first major educational organization to advocate an accelerated program at the secondary school level. In effect, such an accelerated program, if adopted, would enable vocational high-school boys and girls to complete their secondary school training before reaching the draft minimum age of 18 years. This would give such youth opportunity to enter earlier on war-production jobs or enable boys eligible for selective service to enter the Armed Forces far better prepared for assignment to specific duties. The resolution also asked the Office of Education to review all existing policies for war-production worker-training program "for the purpose of inaugurating such changes as may be required . . . for the duration of the war and the post-war period to come."

It was especially indicated through resolutions that the industrial arts program has a valuable contribution to make in the war effort and in post-war problems and their solution. A resolution declared that the A.V.A. "urge that representatives of this field of education (industrial arts) be included in all groups studying the problems pertaining to educational adjustments."

Chicago was selected as the 1943 A.V.A. Convention City.

Fred A. Smith, Little Rock, State Director of Vocational Education in Arkansas, was elected president of the A.V.A. to succeed John J. Seidel, Assistant State Superintendent in Charge of Vocational Education, Baltimore, Maryland. Mr. Smith had served four years as A.V.A. Vice President for Agricultural Education. W. F. Stewart, Department of Agricultural Education, Ohio State University, Columbus, Ohio, was elected Vice President for Part-Time Schools, and J. A. Guitteau, Olympia, Washington, State Supervisor of Agricultural Education, was chosen Vice President for Agricultural Education.

Charles W. Sylvester, Director of Vocational Education in the schools of Baltimore, Maryland, was reelected A.V.A. Treasurer for the fourteenth year. Mr. Sylvester was the recipient of the annual citation from "The Ship," A.V.A. Convention exhibitors' organization, an award given each year to that member of the A.V.A. whom the organization believes has made an outstanding contribution to vocational education.

The Association of State Directors of Vocational Education elected John A. McCarthy, State Director of Vocational Education, Trenton, N. J., as President; Ralph H. Woods, Frankfort, Ky., Vice President; and G. E. Freeman, Nashville, Tenn., as Secretary.

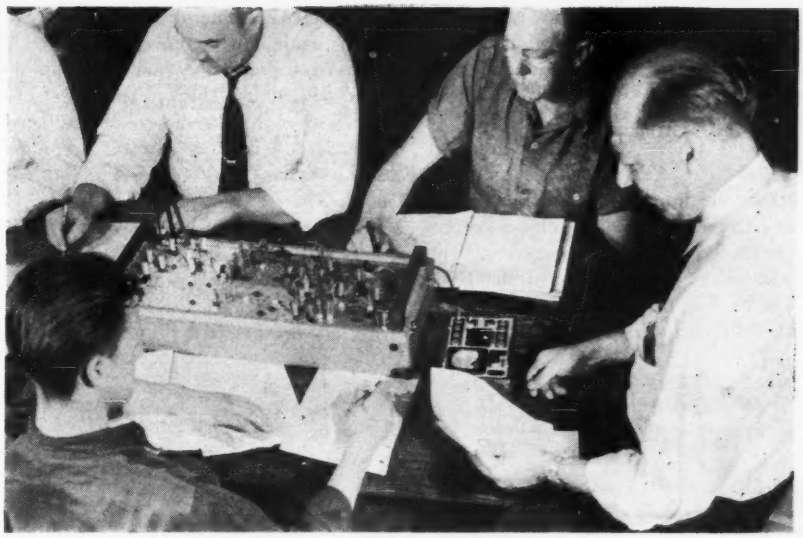
Clyde H. Wilson, Professor of Industrial Education, University of Tennessee, was elected President of the National Association of Industrial Teacher Trainers. Walter B. Jones, University of Pennsylvania, was chosen Secretary.

Two national industrial education organizations were merged at Toledo. They were the National Association of Trade School Principals and the National Council of City Administrators of Vocational Education and Industrial Arts. The new organization is to be known as the National Council of City Directors of Vocational Education, Industrial Arts, and Trade School Principals. Charles F. Bauder, Philadelphia Director of Vocational Education, retiring president of the Trade School Principals Association, was named president of the new group. Earl L. Bedell, Detroit Director of Vocational Education, is Secretary, and Edward Berman, Assistant Superintendent of Schools, Bayonne, N. J., is Treasurer.—*D. M. Cresswell*, Managing Editor, American Vocational Association.

Organizing a Radio Course

BY *John C. Sampson*

Radio is one of the most important shop subjects in preparing students for war activity. Here are teaching aids and a discussion of course content by the Head of the Radio Department, Ranken School of Mechanical Trades, St. Louis, Mo.



The T. R. F. "Troublizer" in action with Instructor Sampson at extreme right.

RELATIVELY speaking, radio work is new and recent when compared to that of the machinist, carpenter, or patternmaker. These older stabilized trades, however, are universally represented in school shops, and the interchanging of ideas simplifies the problem of installing and operating these departments. Manufacturers provide elaborate plans and detailed shop layouts. The machinery and equipment is standard to this extent at least, all lathes run in the same direction, and threads are either left hand or right hand. Books have been published explaining the operation of these shops and projects, materials, job analyses, lesson plans, course layouts, and detailed job sheets are available. Such is not the case with radio.

The following procedure used in planning a radio course can be used in a general way to help the instructor fresh from industry who finds himself in a brand new teaching job.

Step 1. *The Prime Objective:* A two-year full-time day preparatory course and a three-year evening-school extension course to train men for radio service work.

Step 2. *Entrance Requirements:* Eighth-grade graduate, high-school credits preferred, entry at any time of the year.

Step 3. *Rough Draft of Course Content:*

Topic 1. A practical study of the principles of electricity through use of textbooks, discussion, laboratory work, visual aids, and demonstrations. (First semester of first year.)

Topic 2. A practical study of radio fundamentals through use of same devices mentioned above. (Second semester of first year.)

Topic 3. Experiments and jobs that prove and explain the theory in 1 and 2 above through use of laboratory apparatus (project boards), experiment sheets (information and laboratory manual), and job sheets. (First, second, and third semesters of first year.)

Topic 4. Jobs that combine topics 1, 2, and 3 and show functions of radio circuits and components through use of the "Troublizer" and "Troublizer" job sheets. (Second and third semesters of first year and second and third semesters of second year.)

Topic 5. Actual radio service work on radio receivers and public-address systems, phonographs, and combination instruments through actual servicing of receivers and use of service instruments, tools, Rider's *Manuals*, manufacturer's service sheets, and radio service log sheets. (First, second, and third terms of second year.)

These steps can be continued to include even such problems as job placement.

Topic numbers 1, 2, and 3 can be planned from a general course in electricity. Topics 4 and 5 require special consideration because they concern the radio receiver.

Topic number 4 is new within the last two years. It concerns a new instrument, the "Troublizer," designed and constructed in the shops at Ranken School. This instrument applies the basic principles of electricity and radio to the radio receiver, without being in itself a radio set. In reality it is a collection of essential radio components arranged to make circuit changes. Because the circuit and circuit changes have been standardized in this instrument it is possible to set up a series of jobs and step-by-step job sheets that prove that theory and experiment in topics 1, 2, and 3 are necessary to cover topic 5, the actual servicing of radio receivers.

The "Troublizer" alone would have little value as a teaching device. Used in conjunction with specific job sheets, however, it solves the difficult problem of combining theory and practice. To attempt to develop job sheets for use on all types of radio receivers is questionable because the job sheets would be so broad and general that they could be better classified as instruction or information sheets. There is entirely too much variation in radio chassis design to permit the use of a true step-by-step job-sheet analysis of the numerous jobs required to understand the operation and service difficulties. There are differences of opinion concerning the effective use of job sheets. It can be truthfully said, however, that a job sheet represents good planning. If the instructor understands, or will take the time to learn how to write a job sheet, valuable time will be profitably used, and every member of the class will get an equal portion.

I have here taken a simple basic principle of electricity for purposes of demonstration, and have tried to show how it appears in the theory and experimental stage, the shop job, "Troublizer" job sheet, and finally the actual radio service log sheet. The topic is series electrical circuits, and Figure 1 shows the type of job sheet issued to the first-year students working with these circuits as a laboratory experiment. A corrected job report sheet is turned in by the student after completing his job.

Figure 2 shows the type of job sheet designed for shop jobs. This sheet was

selected to show the follow-up in the shop by detailing jobs based on laboratory experiments. A job report form is filled in showing the operations performed.

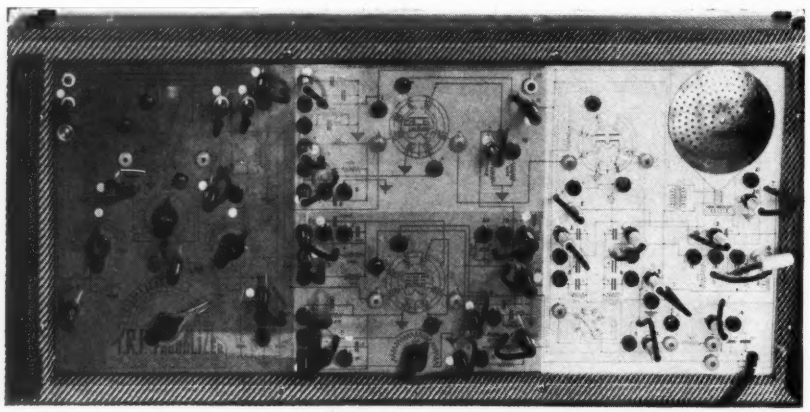
Figure 3 shows a job sheet from unit 2 of the series *A* "Troublizer" job sheet. This second unit relates to filament circuits, and this particular job sheet refers to series circuits in radio receivers. The student can see the value of the basic work he has previously done and just why it is necessary to study these primary electrical principles. A job report form is made out that covers this job.

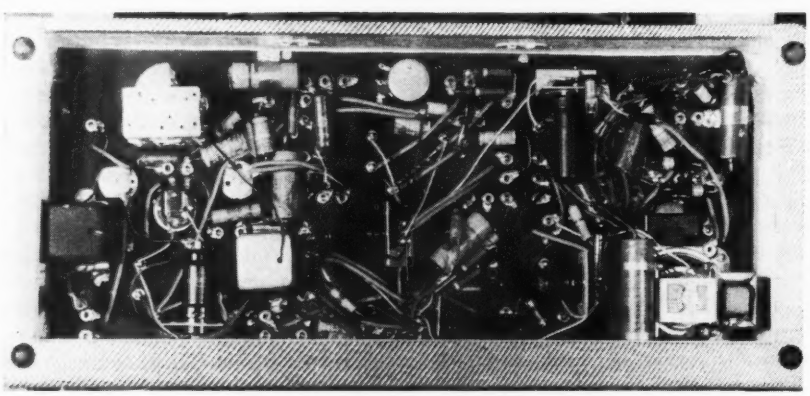
Figure 4 shows the four pages of a radio service log sheet. This type of work is done by the day-school student in his second year, and by the evening-school student in the second and third year. This is the type of work any young man interested in radio service wants to do when he enters the course. It can be seen that the radio service work done, as outlined by the log sheet deals with the series electrical circuit, and the student studied this principle in his first year. The "Troublizer" sheets taught him what to expect when he actually serviced a radio receiver. Showing the student these progressive stages, including the actual service log sheet, convinces him quite easily that it is necessary for him to apply himself to all phases of the training program in order to become a good radio service man.

A summary of the devices used and the sequence of the teaching cycle must include the progress chart. This chart lists in their proper order all types of jobs and is kept in full view of the students.

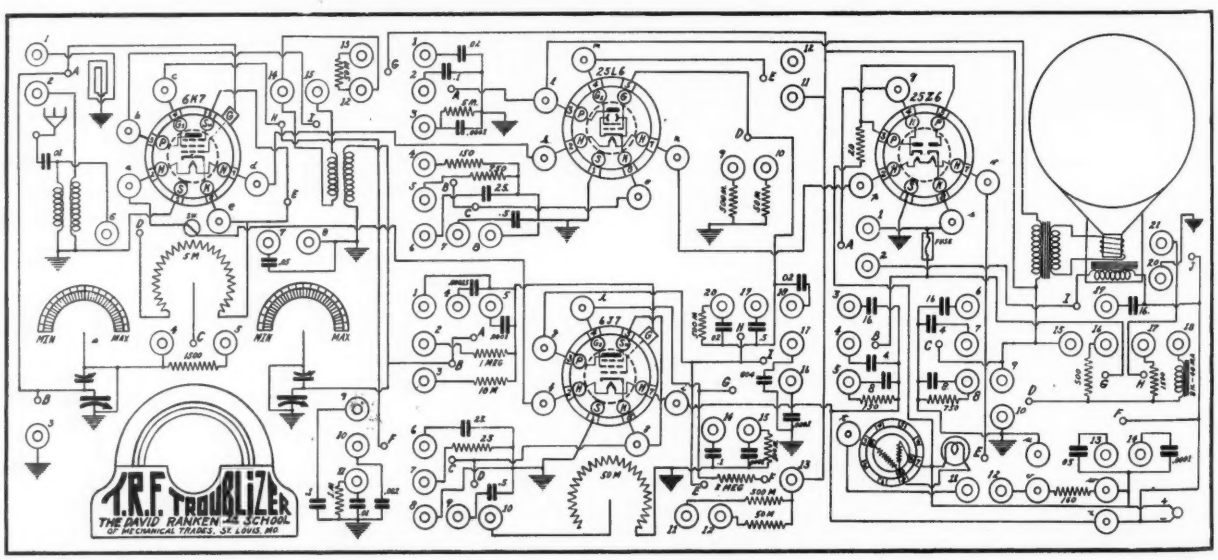
When a job is assigned, two sides of a square are formed in the space provided for each student. When the job is completed the third side is added, and the grade for the job recorded within the three sides. When the job report has been graded and returned, a red line is drawn in at the top of the square, completing all four sides.

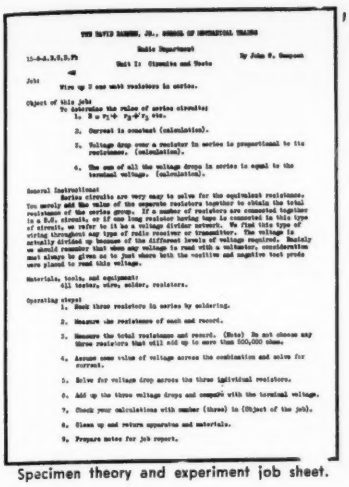
Many students for the first time in their life experience the thrill of competitive ability. Industry does not secretly rate the individual worker. The results of his ability are plainly apparent in the product. The chart parallels closely the well planned procedure of a successfully operated shop by providing a permanent record of the progress of each student.





Above left—Front view of "Troublizer." Middle left—Rear view of "Troublizer." Bottom—Wiring diagram and face plate. The Tuned Radio Frequency (T.R.F.) "Troublizer" was designed and constructed in the radio shop at the David Ranken Jr. School. The name of this unit is descriptive of its use. Normal operation of many different types of tuned radio frequency circuits and filter systems can be connected together by the use of plugs and jacks. The operator can also create any defect in any portion of the circuit that could occur in the actual use of a radio receiver. The results of these defects can be studied and analyzed by the use of regulation radio servicing equipment. This instrument is recommended for use by students studying radio principles and practice, and service men interested in learning more fundamental information about basic radio principles and circuit analysis.





THE DAVID RANKIN, JR., SCHOOL OF MECHANICAL TRADES

Radio Department

By John C. Sampson

Unit I: Circuits and Tools

Job:

Wire up 3 one watt resistors in series.

Object of this job:

To determine the value of series circuits:

1. $R = r_1 + r_2 + r_3$ etc.
2. Current is constant (calculation).
3. Voltage drop over a resistor in series is proportional to its resistance. (calculation).
4. The sum of all the voltage drops in series is equal to the terminal voltage. (calculation).

General Instructions:

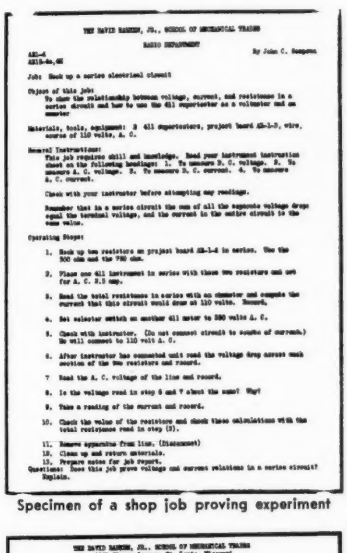
Series circuits are very easy to solve for the equivalent resistance. You merely add the value of the separate resistors together to obtain the total resistance of the series group. If a number of resistors are connected together in a R.C. circuit, or if one long resistor having taps is connected in this type of circuit, we refer to it as a voltage divider network. We find this type of wiring throughout any type of radio receiver or transmitter. The voltage is actually divided up because of the different levels of voltage required. Mainly we should remember that when any voltage is read with a voltmeter, consideration must always be given as to just where both the positive and negative test probe were placed to read this voltage.

Materials, tools, and equipment:
All tester, wire, solder, resistors.

Operating steps:

1. Mark three resistors in series by soldering.
2. Measure the resistances of each and record.
3. Measure the total resistance and record. (Note) Do not choose any three resistors that will add up to more than 500,000 ohms.
4. Assume some value of voltage across the combination and solve for current.
5. Solve for voltage drop across the three individual resistors.
6. Add up the three voltage drops and compare with the terminal voltage.
7. Check your calculations with number (three) in (Object of the job).
8. Clean up and return apparatus and materials.
9. Prepare notes for job report.

Specimen theory and experiment job sheet.



THE DAVID RANKIN, JR., SCHOOL OF MECHANICAL TRADES

RADIO DEPARTMENT

By John C. Sampson

AE-4
AE1B-4a, 4E

Job: Hook up a series electrical circuit

Object of this job:

To show the relationship between voltage, current, and resistance in a series circuit and how to use the 4E1 supertester as a voltmeter and an ammeter

Materials, tools, equipment: 2 4E1 superteters, project board AB-1-3, wire, source of 110 volts, A. C.

General Instructions:

This job requires skill and knowledge. Read your instrument instruction sheet on the following headings: 1. To measure D. C. voltage. 2. To measure A. C. voltage. 3. To measure D. C. current. 4. To measure A. C. current.

Check with your instructor before attempting any readings.

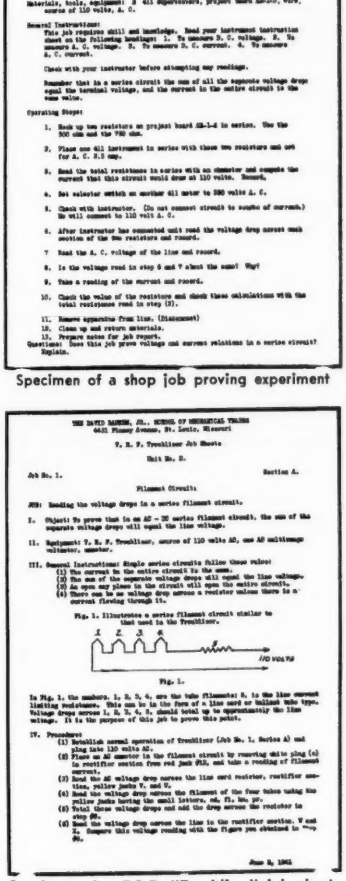
Remember that in a series circuit the sum of all the separate voltage drops equal the terminal voltage, and the current in the entire circuit is the same value.

Operating Steps:

1. Hook up two resistors on project board AB-1-4 in series. Use the 300 ohm and the 750 ohm.
2. Place one 4E1 instrument in series with these two resistors and set for A. C. 0-3 amp.
3. Read the total resistance in series with an ammeter and compute the current that this circuit would draw at 110 volts. Record.
4. Set selector switch on another 4E1 meter to 300 volts A. C.
5. Check with instructor. (Do not connect circuit to source of current.) He will connect to 110 volt A. C.
6. After instructor has connected unit read the voltage drop across each section of the two resistors and record.
7. Read the A. C. voltage of the line and record.
8. Is the voltage read in step 6 and 7 about the same? Why?
9. Take a reading of the current and record.
10. Check the value of the resistors and check these calculations with the total resistances read in step (3).
11. Remove apparatus from line. (Disconnect)
12. Clean up and return materials.
13. Prepare notes for job report.

Questions: Does this job prove voltage and current relations in a series circuit? Explain.

Specimen of a shop job proving experiment



THE DAVID RANKIN, JR., SCHOOL OF MECHANICAL TRADES
6431 Finney Avenue, St. Louis, Missouri

T. R. F. Troublizer Job Sheets

Unit No. 2.

Job No. 1. Section A.

Filament Circuits

JOB: Reading the voltage drops in a series filament circuit.

I. Object: To prove that in an AC - DC series filament circuit, the sum of the separate voltage drops will equal the line voltage.

II. Equipment: T. R. F. Troublizer, source of 110 volts AC, one AC voltmeter, voltmeter, ammeter.

III. General Instructions: Simple series circuits follow these rules:
(1) The current in the entire circuit is the same.
(2) The sum of the separate voltage drops will equal the line voltage.
(3) An open any place in the circuit will open the entire circuit.
(4) There can be no voltage drop across a resistor unless there is a current flowing through it.

Fig. 1. Illustrates a series filament circuit similar to that used in the Troublizer.

Fig. 1.

In Fig. 1, the numbers, 1, 2, 3, 4, are the tube filaments; 5, is the line current limiting resistance. This can be in the form of a line cord or ballast tube type. Voltage drops across 1, 2, 3, 4, 5, should total up to approximately the line voltage. It is the purpose of this job to prove this point.

IV. Procedure:
(1) Establish normal operation of Troublizer (Job No. 1, Series A) and plug into 110 volts AC.
(2) Place an AC ammeter in the filament circuit by removing white plug (a) in rectifier section from red jack (#2), and take a reading of filament current.
(3) Read the AC voltage drop across the line cord resistor, rectifier section, yellow jacks U, and V.
(4) Read the voltage drop across the filament of the four tubes using the yellow jacks having the small letters, ab, fi, hm, pr.
(5) Total these voltage drops and add the drop across the resistor in step #3.
(6) Read the voltage drop across the line in the rectifier section, V and X. Compare this voltage reading with the figure you obtained in step #4.

June 8, 1941

Page 2.

NOTE: When you place a voltmeter across a filament to read the voltage drop across it you actually parallel this filament with the resistance of the voltmeter and lower the voltage drop across the combination. The sum of these voltage drops as read with the voltmeter will never total the line voltage, but should be within 5%.

(7) Remove any one of the radio tubes from the socket and repeat steps #3, #4, #5, and #6. Record results.

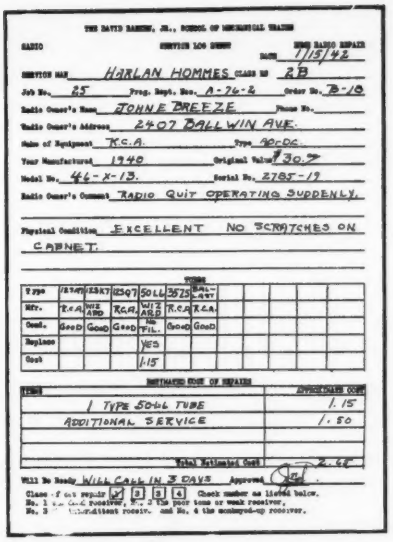
NOTE: Use 300 volt AC range on voltmeter when taking these readings.

(8) Draw the filament circuit from the panel circuit on the troublizer, showing the voltage drops and the line voltage.

V. Check up questions:
(1) State the two most important characteristics of a series circuit.
(2) Why do most voltmeters not on a parallel resistance when reading the voltage drop across a resistor?
(3) Explain why you obtained the readings you did in step #7

VI. Assignments:
(1) In preparing your job report under section VIII, sketch or draw circuit prepared in step #8 under procedure.
(2) Universal Radio Repairs Course.
Pages 726-732, Articles #19, #20

Specimen of a T.R.F. "Troublizer" job sheet.



THE DAVID RANKIN, JR., SCHOOL OF MECHANICAL TRADES

RADIO — SERVICE LOG SHEET — TIME RADIO REPAIR — DATE 7/15/42

STUDENT NAME HARLAN HOMMES CLASS NO 2B

Job No. 25 Prog. Dept. Doc. A-74-4 Order No. B-18

Radio Owner's Name JOHNIE BREEZE Phone No.

Radio Owner's Address 2407 BALLWIN AVE.

Make of Equipment R.C.A. Type 90-DC

Year Manufactured 1940 Original Value $30.?

Model No. 46-X-13. Serial No. 2785-19

Radio Owner's Comment RADIO QUIT OPERATING SUDDENLY.

Physical Condition EXCELLENT NO SCRATCHES ON CABINET.

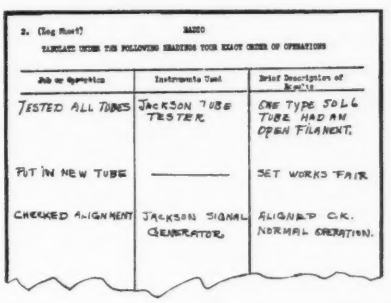
TUBES	12SA7	12SK7	12SQ7	50L6	35Z5	BAL-AST					
Mfr.	R.C.A.	WIZARD	R.C.A.	WIZARD	R.C.A.	R.C.A.					
Cond.	GOOD	GOOD	GOOD	NO FIL.	GOOD	GOOD					
Replace				YES							
Cost				1.15							

ESTIMATED COST OF REPAIRS

	APPROXIMATE COST
1 TYPE 50L6 TUBE	1.15
ADDITIONAL SERVICE	1.50
Total Estimated Cost	2.65

Will Be Ready WILL CALL IN 3 DAYS Approved

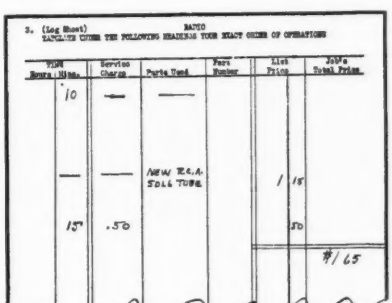
Class of set repair [x] 1 [ ] 2 [ ] 3 [ ] 4 Check number as listed below.
No. 1 is a good receiver, No. 2 has poor tone or weak receiver.
No. 3 is an indifferent receiver, and No. 4 the scrapped-up receiver.



2. (Log Sheet) RADIO

TABULATE UNDER THE FOLLOWING HEADINGS YOUR EXACT ORDER OF OPERATIONS

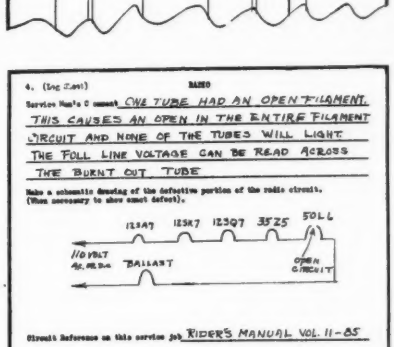
Job or Operation	Instruments Used	Brief Description of Results
TESTED ALL TUBES	JACKSON TUBE TESTER	ONE TYPE 50L6 TUBE HAD AN OPEN FILAMENT.
PUT IN NEW TUBE	———	SET WORKS FAIR
CHECKED ALIGNMENT	JACKSON SIGNAL GENERATOR	ALIGNED O.K. NORMAL OPERATION.



3. (Log Sheet) RADIO

TABULATE UNDER THE FOLLOWING HEADINGS YOUR EXACT ORDER OF OPERATIONS

TIME Hours Mins.	Service Charge	Parts Used	Part Number	List Price	Job's Total Price
10	—	———			
—	—	NEW R.C.A. 50L6 TUBE		1 15	
15	.50			50	
					#1 65



4. (Log Sheet) RADIO

Service Man's Comment ONE TUBE HAD AN OPEN FILAMENT. THIS CAUSES AN OPEN IN THE ENTIRE FILAMENT CIRCUIT AND NONE OF THE TUBES WILL LIGHT. THE FULL LINE VOLTAGE CAN BE READ ACROSS THE BURNT OUT TUBE

Make a schematic drawing of the defective portion of the radio circuit. (When necessary to show exact defect).

Circuit Reference on this service job RIDER'S MANUAL VOL. 11-85

DEPARTMENT HEAD'S COMMENT

IF YOU CHECK A RADIO IN THIS CONDITION WITH A VOLTMETER, ACROSS THE FILAMENTS, BE SURE THE VOLTMETER RANGE IS 150 VOLTS OR HIGHER.

Approved Charge $ 2.00 Signed J. C. Sampson 12/22/42

Specimen of a radio service log sheet which shows the same type of job as the theory, shop, and "Troublizer" job sheets.

Post-War Education . . .

(Continued from page 4)

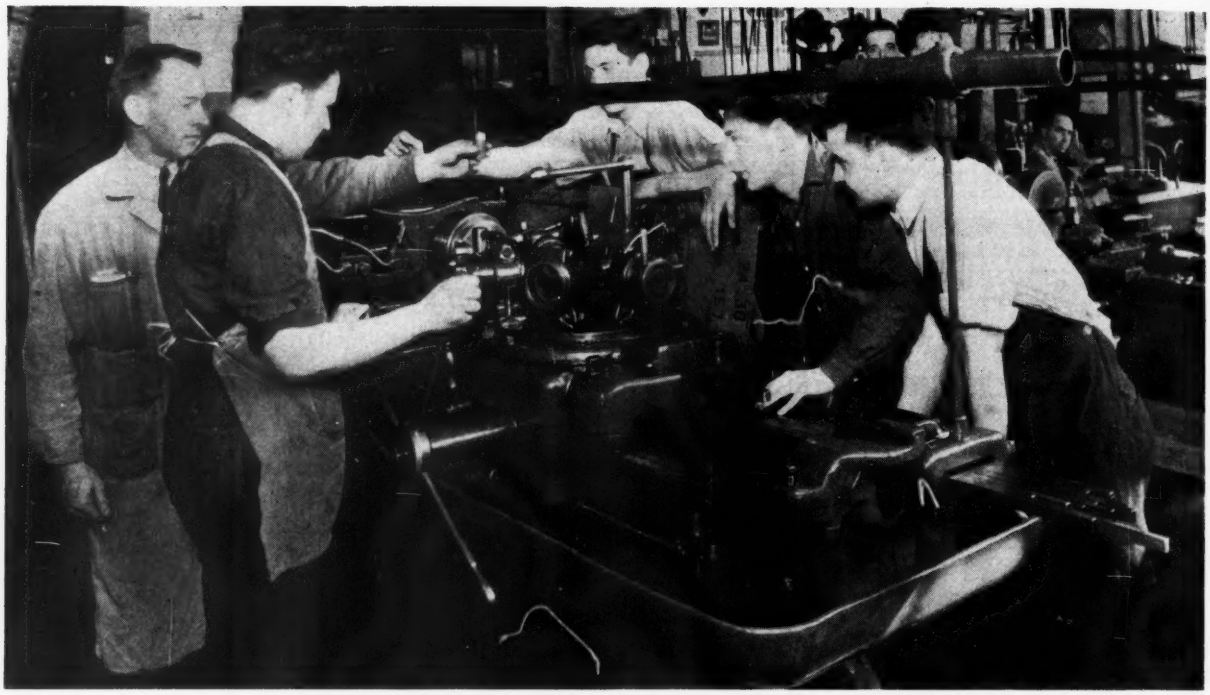
largely influenced by *modern industry*, not *craft industry*. Hence industrial arts after the war must stress modern methods of production rather than medieval hand-craft methods. Modern machine and factory procedures can be made highly educative if teachers will so use them. It will in the future be hard to defend any other methods of work in school shops. (5) The war has demonstrated the great need for training in the technical aspects of modern industrial work, as contrasted with the manual aspects, alone. More emphasis, therefore, must be placed on underlying theory and technical knowledge involved in shop and drawing activities. Not only *how* to do, but *why* do in such a manner, will need greater attention than formerly. (6) Greater attention must also be given to the fact that the industrial arts experiences are basic to large areas of industrial vocations. Children must be led to see this relationship and to think more definitely of their shop and drawing-room tasks as preparation for possible later training for industrial occupations. And (7) industrial arts must be made available to all children everywhere. That still is not the case. It must be as universally available as arithmetic and grammar.

These developments which now appear as probable should in no wise be considered as displacing the traditional concerns of good industrial arts teaching but as new points of emphasis. Every factor in the present situation points to a new growth and new importance to all industrial education. Only a failure of leaders and teachers to grasp the real significance of observable trends can delay the arrival of a new day for both vocational-industrial education and industrial arts in the post-war era.

Welding Hint.—In a magazine I recently saw a long heavy complicated handle for holding short pieces of acetylene welding rod. But after making this heavy handle you still cannot use the last two inches of the rod. A good hint for gas welders is to leave the last length of short rod sticking in the weld and then weld the new piece of rod to the short piece, heat the rod in the weld and proceed. A lot of welding shops don't know about this hint as I have seen short pieces of rod lying about in many of them. This hint would leave engine lathes free for defense work.—J. C. Branstetter, Mission High School, San Francisco, Calif.

SHOP TRAINING FOR VICTORY

A monthly department devoted to items of interest concerning war-training classes



Class in turret-lathe operation, Springfield, Mass., Trade School

Is Your War Training Geared to Industry's Needs?

BY *George H. Parkes*

THE local director and shop instructor are never certain that their training meets the needs of industry unless they get into the production plants and study the work and machines first hand. To drive this point home, I would like to report on a study made by Winfield F. Beyer, a plant coordinator associated with the writer. Mr. Beyer studied the frequency of machine-tool operation in a typical aircraft engine manufacturing plant, with the object of selecting the machines and operations most likely to confront trainees on their first job. At the risk of annoying my machine-shop friends, I present the following facts and interpretations.

For an effective training program, the type of analysis discussed here must be made to determine the needs of industries in the locality of the training school. George H. Parkes is director of the Williamsport, Pa., Technical Institute.

The engine lathe is one of the least important machine tools from the viewpoint of war-production training, at least in the plant studied! The most important machine tool is the lowly drill press, with the turret lathe, milling machine, and grinder all outranking the engine lathe. Only the boring mill is used less than the engine lathes, unless the planer and shaper are counted, and these two are not used on production in this plant at all. Here is the score:

Drill press	435 operations
Turret lathe	413 operations
Milling machines	125 operations
Engine lathes	83 operations
Boring mill	13 operations
Total operations studied	1069 operations

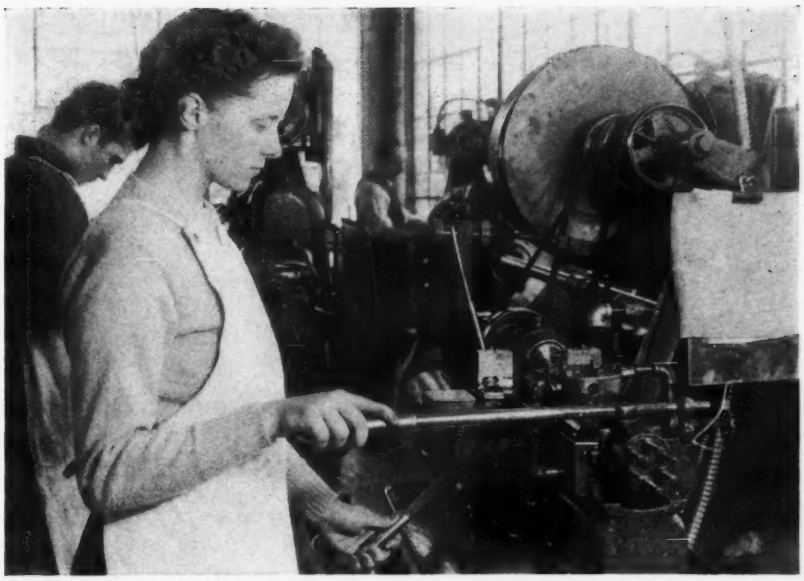
Before the machine-shop boys get into sparring position, let me hasten to remind them that this is a situation existing in one class of machine manufacturing alone, and for operator training only. I'm not talking about toolrooms, repair shops, job shops, and heavy manufacturing; I'm talking about production line jobs since most of our war-production training is for operations and operators anyway. I'm not trying to spoil anything, but I do suggest that you get into your industry and find out if you are training men and women on engine lathes to prepare them to operate drill presses.

A great many school machine shops offer "general" training to their day trade-school boys because the courses are long enough to permit some approach to an all-around machine-shop ability. It is not uncommon to find a school machine shop equipped exclusively with engine lathes, with a few other tools available for incidental work. The drill press, a most efficient and flexible tool, is rarely the subject

of definitely outlined training. My machine-shop friends would like to make the point that the engine lathe is basic to all other tools, and that a boy can learn to operate any other tool much better if he has first mastered the engine lathe. Don't look now, but this sounds a little like the old theory that Latin is good for any boy because he can understand English better if he knows Latin.

I guess it's not too bad for us to give the boy in the day trade school three years of general machine-shop instruction, with the lathe as a home base, but when we try to translate this into war-production training for short-time trainees, we are on thin ice. There is no proof that the engine lathe prepares for drill-press operation or the operation of any other tool including the turret lathe. We ought to train on the machine of production at once, and if we haven't such tools, let's admit that we are doing the best we can with substitute machines.

You will note that the drill presses rank high in Mr. Beyer's study as a production machine. Drill presses are comparatively cheap, and not so hard to get as lathes. Turret lathes are almost denied to school shops under present priorities. It is amazing how effectively an engine lathe can be turned into a turret lathe with the addition of a few attachments. Excess lathes can be turned into passable milling machines and fairly effective grinders.



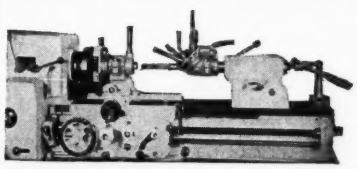
"Turret lathes are five times as important in operator training as engine lathes . . ."

If we are forced to use engine lathes because of existing conditions, a study of plant practices will eliminate some questionable production work on this tool. For example:

1. Production threads are not "chased" on engine lathes, they are produced on screw machines, thread millers, by hobbing, on thread grinders, and by tapping.

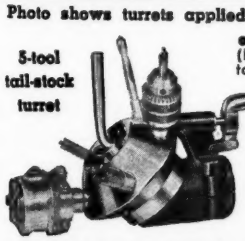
(Continued on page 16)

ANY ENGINE LATHE CAN BE CONVERTED INTO *A Turret Lathe* IN 15 SECONDS



Train TURRET LATHE Operators on your ENGINE LATHE

Photo shows turrets applied to 16" lathe

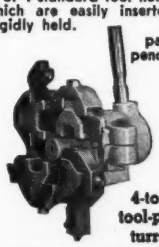


5-tool tail-stock turret

● This new modern TOOL-POST TURRET (below, right), made in 2 sizes, designed to increase production on engine lathes. Easily mounted on cross slide or compound rest. Has capacity of 4 standard tool holders which are easily inserted and rigidly held.

6 days delivery

pat. pending



4-tool tool-post turret

● Then there's the completely modernized 5-tool TAIL-STOCK TURRET (above), made in 4 sizes to fit small bench lathes and lathes up to 24" swing. Also the adjustable PULL-FEED LEVER. All tools are precision made attachments which will convert any engine lathe into a production turret lathe.

Jefferson Turrets are real production tools—substantial, rigid, accurate, and adaptable to any size or make of engine lathe. They must not be confused with small makeshift gadgets now on the market.

Write for a bulletin of these and other JEFFERSON TOOLS!

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Project of the Month:

Tap and Die Toolboard

BY *William E. Huss*

This woodworking project is useful as an instructional device as it gives the student information on the number and size of the tap drill. It is also a handy method for caring for taps and dies. William E. Huss teaches general metalwork at the Oswego, N.Y., State Teachers College.

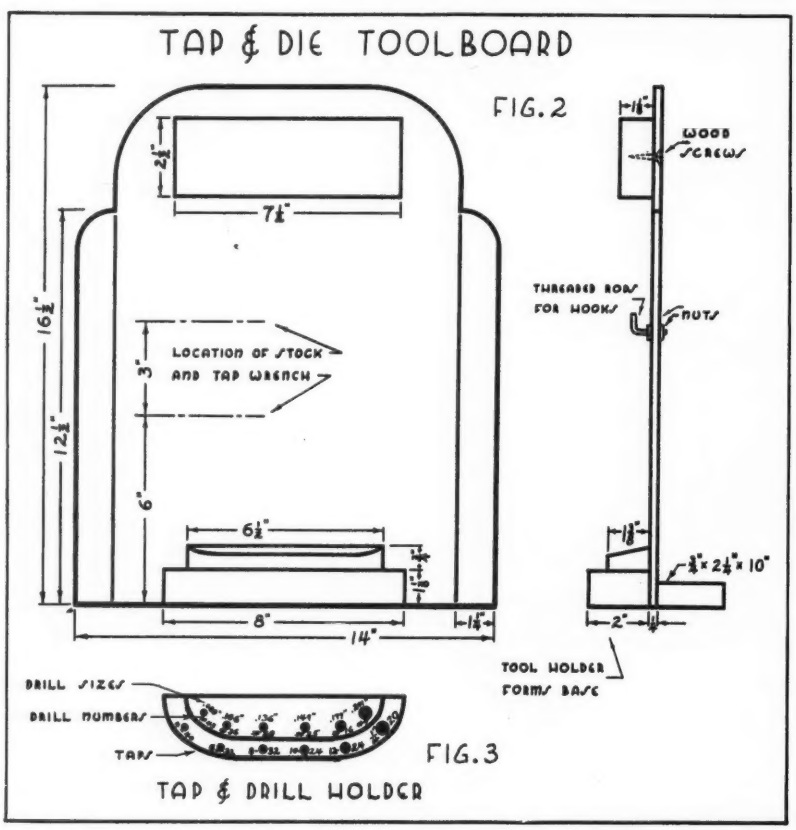
THE distribution of taps and dies for threading has always been a problem in the school shop. Some teachers have attempted to solve this problem by keeping the taps and dies locked up. The student must come to the instructor when a tap is needed. It is then possible to ascertain that the pupil understands the information about tap drill sizes. However, this method is objectionable because it consumes an unreasonable amount of the student's and instructor's time.

Much time can be saved if the taps and drills are kept together where the student has access to them. The taps and drills will not be lost for lack of a place to return them. This is an improvement over the first method but it keeps from the student the information concerning the size and number of the tap drills.

The tap and die tool board shown in Fig. 1 is designed to overcome these difficulties. It makes the taps and drills easily accessible and yet it gives the student the information about the number and size of the tap drill as well as the body drill size for each of the common taps.

This toolboard may be used in any part of the shop. The base is made large enough so the toolboard stands upright when it is used at any work station at the bench.

The detail drawing of the tap and drill holder, (Fig. 3) shows how the information is given concerning the number of the tap drill and its diameter. This is designed to promote learning the common tap drill sizes as well as to make the tap drills easily available.



Construction.—Oak plywood is a suitable material for this toolboard. Cut the contour as shown in the working drawing (Fig 2). A handle could be added to the top to make it easier to carry about. Cut the tool holders from wood having a color that contrasts with oak. White pine or maple gives an attractive effect on oak plywood. Fasten the tool holders to the toolboard with wood screws through the back so there will be no evidence of fasteners on the front. The tap and drill rack is mounted at the bottom so it may be used as a base. The rear half of the base is constructed in the same manner.

Make the tool hooks from steel rods threaded for a supporting nut on both front and rear as shown in Fig. 2. This seems to be a suitable way to fasten hooks to thin plywood.

Finishing.—Apply paste wood filler to the oak plywood surface. When the filler has dried, apply a coat of shellac to the entire toolboard, including the tool holders. The tool outlines and the stripe designs are applied with a Speedball pen and India ink. If a few drops of aerosol are added to the ink, it will adhere readily to the shellacked surface. Varnish should be used over the outlines to prevent the India ink from smudging as well as to give the toolboard a permanent finish.

Front Cover . . .

Emphasizing the increasing importance of radio as a school shop subject is this month's cover picture which shows a student in the Seneca Vocational High School in Buffalo, N. Y., tuning a transmitter. The pre-induction courses for the Army which the schools are now offering include one covering the fundamentals of radio.

☆ The War has helped teach American Industry a *Vital Lesson!*

Even before the war created the need for production miracles—there was a widespread acceptance of Delta low-cost machines in almost every branch of American Industry. But now—in their hour of urgent need—our manufacturers have turned toward the so-called "light machine tool" on a scale that few people fully appreciate.

In tens of thousands of plants—including aircraft, armament, ship building, plastics, general manufacturing—Delta machines have given an appreciable lift to war production. Some single plants have as many as two thousand individual Delta machines operating at full capacity.

The reasons for this basic change in our industrial production methods include: Increased output, ease of training operators, availability, adaptability, flexibility, low first cost, low maintenance cost and portability.

Many far-sighted industrial education departments have anticipated this trend and made Delta machines an integral part of their training program. Many others recognize that this important change in industrial production technique must inevitably influence greatly the future of vocational training.

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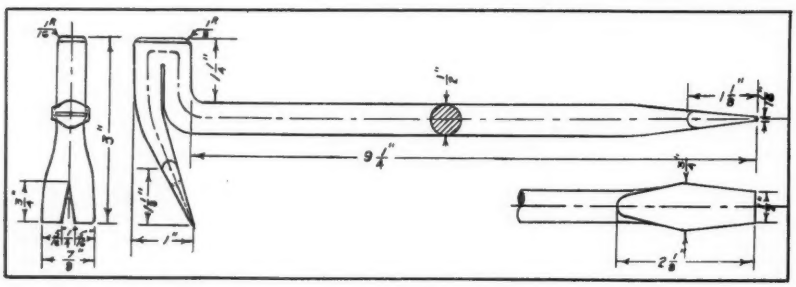
A Forged Tack Hammer

BY *N. H. Poole*

This project is excellent for teaching such forging operations as upsetting, drawing down, bending, and case hardening and has utility value as well. N. H. Poole teaches at Emmerich Manual Training High School, Indianapolis, Indiana.

AT present it is difficult for schools to get steel supplies so here is a project which can be made from scrap or ends and which offers the student an opportunity to learn several fundamental operations. This tool-making project involves upsetting, drawing down, bending, shaping, hot cutting, case hardening, and polishing. Only one piece of mild steel rod ½" round by 14½" long is required and these ends may be found around a steel supply house, a hardware store, a blacksmith shop, or a machine shop. When completed the boy has (in one tool) a tack hammer, a tack lifter, a pry bar, and a screw driver which he can use or which will be useful around the home.



The procedure:

1. *Forming the tack lifter.*—Heat one end of the rod to an orange color in the forge. Upset it to ⅝" in diameter. Measure back 1¼" from this end, and, hammering on one side only, draw this end down to 1/16" thick by ⅞" wide. (Use the center punch or cold chisel for laying off measurement marks as these can be easily seen on the heated metal.) Next lay off the slot for the lifter and cut it out with the hot-cut chisel. This slot should be ¾" long, ¼" wide at the bottom and taper to a point at the top. To get a flare on the slot hold the chisel at an angle when cutting.

2. *Forming the pole end.*—Measure back 2¾" from the flattened end and heat this point to an orange heat. Bend this length, with the flare of the lifter slot facing in, first to a right angle and then continue to bend it until it is bent down against the rest of the rod.

3. *Forming the handle.*—Measure 1¼" from the bend. Heat at this point and then loosely clamp the work in a vise at the measured section and bend to a right angle.

4. *Completing the shape of the lifter.*—Reheat the metal opposite to where the handle starts and bend it in 1" toward the handle. Cool the metal and with a three square file dress the slot in the tack lifter.

5. *Forming the screwdriver.*—Check the length of the handle. Lay off 1" from the end; heat and forge it to form the screw driver.

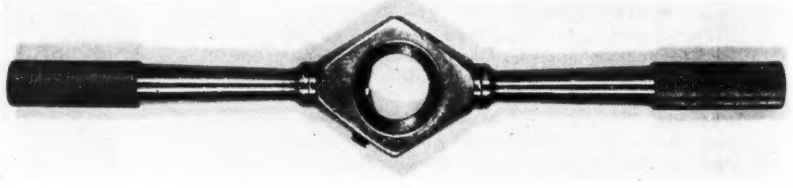
6. Grind a square face on the pole. Rough polish the pole.

7. File and shape up the screwdriver. Rough polish.

8. *Case hardening.*—The face, tack lifter claws, and screwdriver can be toughened by case hardening. Since cyanide baths are rather dangerous to use in schools it is recommended that some commercial powdered compound be used in forming the "case."

9. *Polishing.*—To polish the tool use a smooth file, emery cloth, carborundum, and canvas buffing wheels. (Remember the "case" is not deep so do not remove so much metal in polishing that you cut through into the soft metal.)

10. *Lacquering.*—To keep the tool from rusting it should be washed in benzine and given a coat of clear lacquer. Or the tool can be washed in benzine and given a coat of motor oil.



Die Holder

BY *Glen B. Christy*

This metal unit is in operation-sheet form. It has been used successfully to teach machining operations to advanced students in the war-worker training program at Lane Technical High School, Chicago, where the author now teaches.

THERE are 1" die holders on the market ranging in sizes from ⅝" down to the smallest sizes. This range covers 75% of hand-die thread cutting operations in the average shop. Should a die holder be desired for the ⅞" or ¾" dies it is only necessary to alter the dimensions of the boring and counter boring operation in the head of this die holder to fit the smaller dies.

The 1" die holder is a project for advanced students. It requires accurate workmanship or the handles will be out of line and the die holder will not fit properly into the die head. It includes 11 lathe operations as well as an advanced drilling and tapping operation.

Body

1. Cut stock ½" x 2 1/16" x 1½". Caution. The centers you lay out on

the body must be exactly the center. An error of 1/64" can easily be seen on the finished product.

2. Lay out centers on the ½" x 1½" ends. Draw diagonals on the ends. The intersections of these diagonals will be the center. Check these centers with your dividers because they must be accurate.

3. Lay out center on one face 1½" x 2 1/16". Check this center for accuracy; it must be in the center.

4. Chuck the stock with the center on the 1½" x 2 1/16" face outside. (Center the stock in the chuck so that the center punch mark is exactly center.)

5. Drill a 3/16" hole at center punch mark. Drill this hole to ⅝".

6. Bore the ⅝" hole to ¾".

7. Counter bore to 1" + 1/64" — 0 and ½" deep.

8. Drill center punch marks on ends with center drill.

9. Place between centers.

10. Set compound rest to 30°.

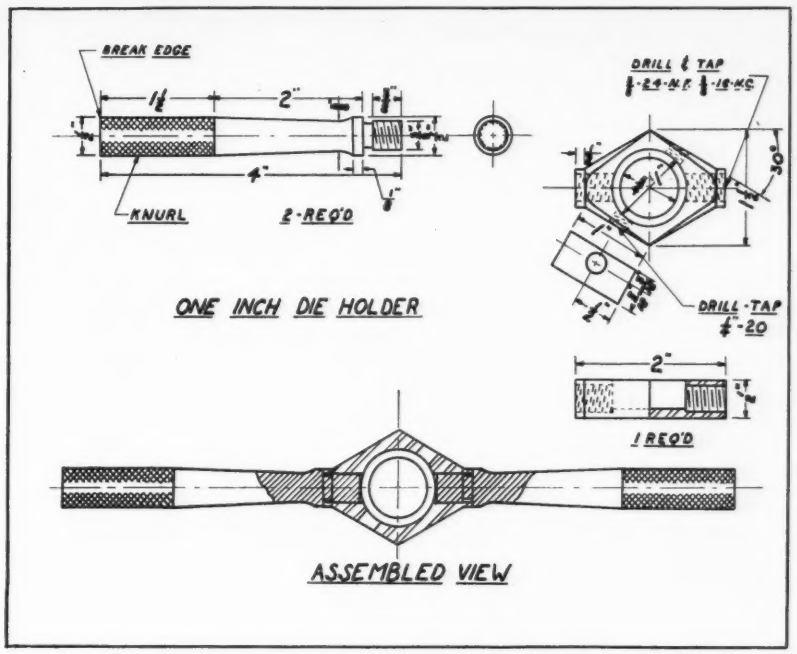
11. Use compound feed only. Turn to dimensions given on the blueprint.

12. Turn stock around and turn other end.

13. Face turn ends to dimensions.

14. Stamp your name on the body of the wrench.

15. Place stock in drill-press vise and drill and tap as shown on the blueprint.



(Caution: Great care must be taken to drill holes exactly through the center. These holes must match as one hole or the handles will be out of line.)

Handles

1. Cut ⅝" round stock 4 1/16" long.
2. Center drill each end.
3. Face ends to bring stock to 4".
4. Turn to dimensions.

Taper with tail stock set over.

$\frac{LD\text{-}Sd}{2}$ times $\frac{L\ stock}{L\ taper}$ equals tail stock set over.

(Continued on next page)

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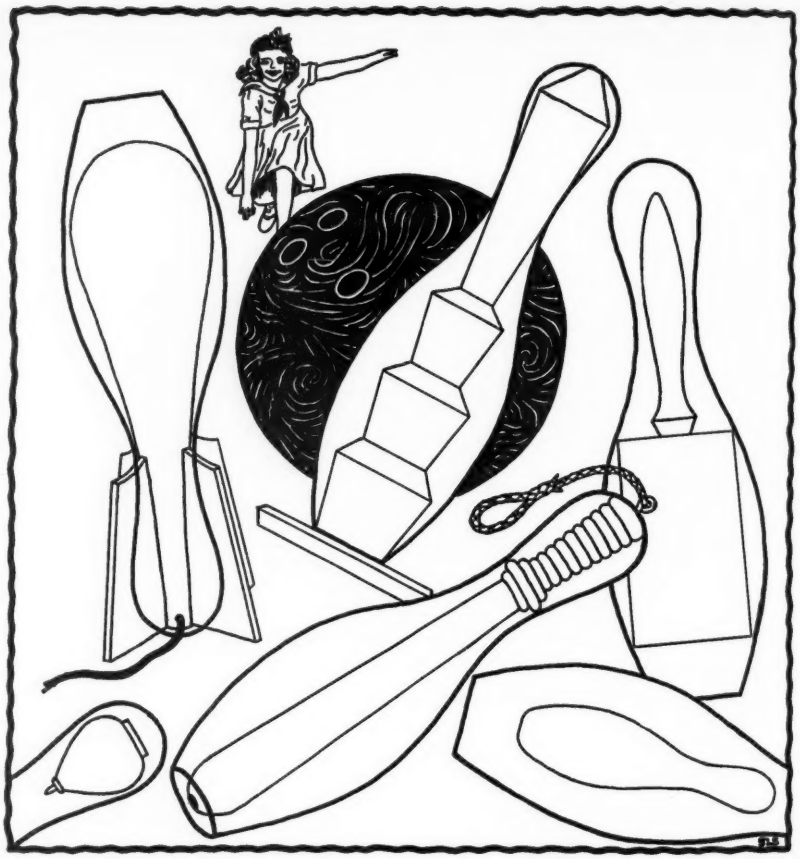
Bowling Pin Projects

BY *Stan Schirmacher*

These unique bowling pin projects are excellent for teaching wood turning as they appeal very strongly to boys. Stan Schirmacher teaches industrial arts at the Tempe, Arizona, High School.



HAVE you tried making lathe-turned projects from old discarded bowling pins? If not, just purchase a few (for only 5 or 10 cents apiece) from your local bowling "emporium," make some simple projects from them, and then watch the boys bring in the pins and rush the lathes! It is a thrill to the lathe student to transform the battered white pins into articles which reveal the beautiful select hard maple hidden within.

One timely project is the airplane bomb lamp, as shown on the left in the illustration. The base of the pins have a hole drilled in them which accommodates a 60° dead center but the top must be drilled with a ⅛" drill for the point of the spur center. The maximum finished diameter is approximately 4", and the "bomb" tapers down to about 1⅜". The four fins (3½" x 6") are made of three-ply veneer and are glued in the grooves which can be chiselled. A cord outlet hole is drilled near the bottom to meet the full-length ⅜" hole, and a ⅛" nipple to hold the socket is placed in the top. The finish can be black or gun-metal blue enamel, or crystal and wrinkle radio varnish.

Other lamps can be turned as is pictured in the center. Also very attractive lamps can be made as plain bowling pins. In this case, the pin is turned until the solid maple is reached. Of course, the original diameter and shape is not retained, but the difference is not noticeable. A shellac polish finish without staining or painting makes the lamp look like "the real thing." The pin can be fastened to an oval base alongside a lathe-turned "bowling ball" which is drilled with finger-holes to be used as pencil-holders. A square base may be made of a number of ¾" x 1" strips glued together to represent the bowling floor.

The project illustrated at the right makes clever marital presentations or novel kitchen "decoration pieces" when labelled: "Ye Olde One-Handled Rolling Pin and Lyin' Tamer" or "Better Balanced Bean Bashing Bum Bouncer!" The handle is polished while the body is left lathe-sanded. A screw-eye can be added to the end of the handle for hanging.

Another timely project is the billy-club shown at the bottom-center. These can be sold or given to defense police groups as well as to other law-enforcement officials. No length is lost in construction because the chuck end is not lathe turned and the other end is finished right up to the hole in the base (which is later filled with lead, giving it just the right weight and balance). The thumb string is four-strand braided leather or imitation leather lacing and is made with a large loop which can slip loosely off the thumb in case the club is jerked from the hand. In place, the string passes across the back of the hand from the thumb to the handle.

Stocking darners of various designs can be made of the "maples." The one illustrated at the lower right is made exactly one-half the size of a regulation pin. The only major difference is found at the base, which has the edge rounded for better darning purposes.

If the tops are cut off of the pins, as in the turning of shorter articles like the darners, they can be utilized also. Sturdy tops can be quickly made out of them, similar to the one shown at the left-bottom of the drawing. The metal point is a double-head form-builders nail with the top head cut off and pointed.

Die Holder

(Continued from page 13)

5. Knurl large end.
6. Place copper strip around knurled end and thread other end according to the blueprint.
7. File and polish.

Body

1. Drill and tap for set screws.
2. Polish.
3. Assemble.

Handles

The knurled ends of the die holder handles may be drilled with a 5/16" drill 2½" deep. This will lighten the die holder.

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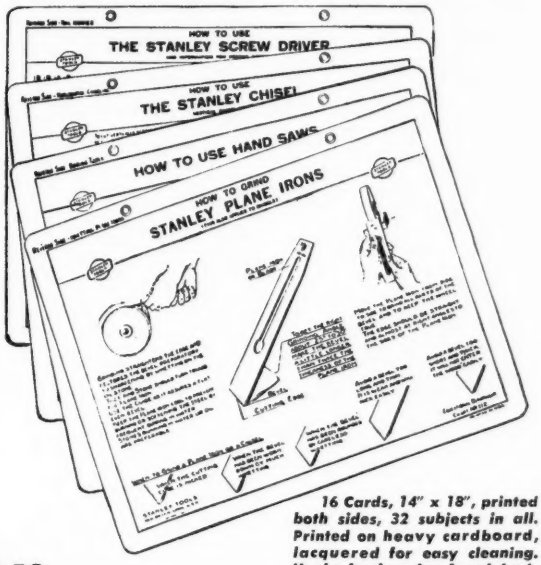

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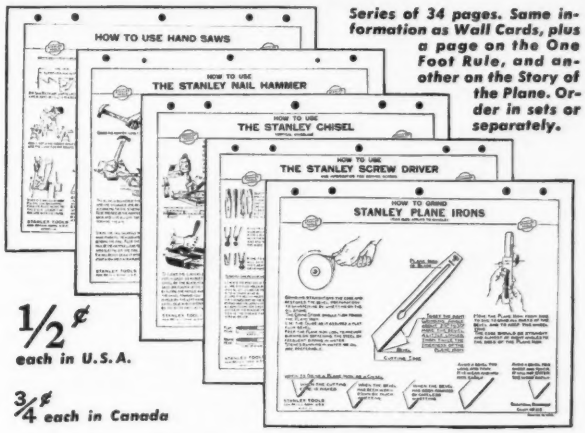

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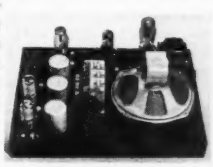

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War Training

(Continued from page 9)

2. Knurling, another teacher's pet, is not commercially important except on screw machines. Reaming, drilling, tapping, and work held on mandrels between centers are all engine lathe operations which are used by the toolmaker and all around machinist, but they are of questionable value from the viewpoint of production operator training.

On the other hand, the engine lathe, even though not converted into a turret lathe, may be used to simulate a production tool by careful attention to production jobs. The use of special chucks, machine stops, roughing and finishing cuts, and production feeds and speeds will do much to prepare the learner for a production job. There is doubtful production training in any job or operation which is not repeated, without deviation, at least ten times. The trainee who completes a single plumb-bob project in all of its parts in a short-term course, produces something which is very attractive, and which gives him tremendous satisfaction. There is considerable doubt, however, as to its operator-training value.

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Bridge Lamp

BY *J. E. Tolman*

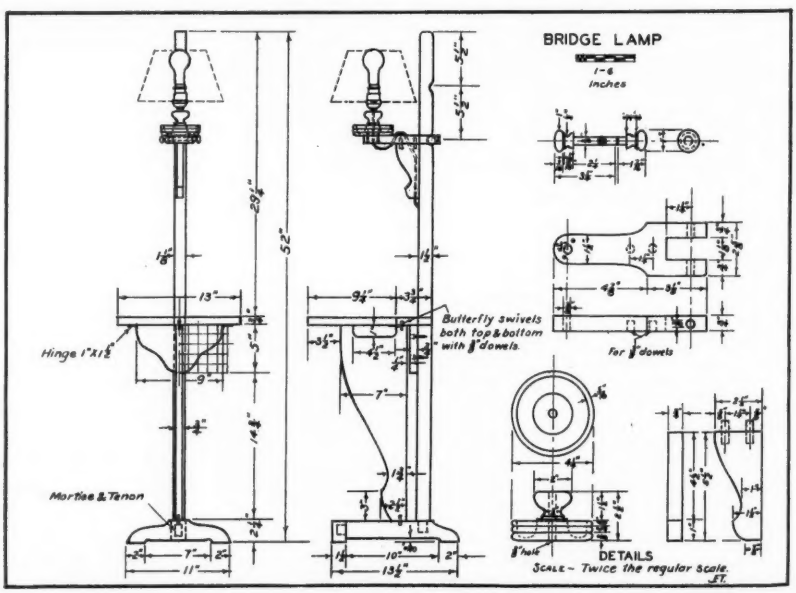
This project has been used very successfully with students in advanced woodworking classes. The project offers an opportunity to do interesting work in finishing. J. E. Tolman is head of the woodshop in the Chaffey Union High School, Ontario, California.

THIS particular type of bridge lamp is of a pleasing design which will blend in with either the Cape Cod or Monterey style in furniture. The processes in preparing for the finish and the type of finish are the keys to the lamp as a satisfactory project.

If the lamp is to be used in an Old Colony or Cape Cod setting, maple is usually the wood preferred. In preparing the wood for the finish, slightly rounded edges, well sanded with corners often flattened, will lend to the piece the atmosphere of that period.

A soft brown maple finish, which is a characteristic finish of this period, may be obtained with rubbed lacquer. A coat of quick-drying stain is first sprayed on the bare wood. In about 20 minutes a coat of lacquer sealer is then sprayed over the stain. This coat is lightly steel wooled with No. 2-0 steel wool. An application with a brush of Van Dyke brown and burnt umber in mineral turpentine will do much to liven up and enrich the finish as a whole. This material must be wiped clean with a rag. Allow this coat to dry overnight. The rest of the finish consists of two or three coats of semi-gloss lacquer sprayed on at intervals of about 20 minutes.

To finish this lamp to blend in with the Monterey type of furniture, wood with large open pores should be used. Oak or Philippine mahogany are woods of this type. If the finish is to be put on with brush, two coats of flat white under-coater should be applied. If a spray gun is available, an under-coater sprayed on gives a very satisfactory base. It is slightly preferable to the brush job. The next coat is an antiquing glaze mixed with a small amount of umber and sienna in mineral turpentine. This is applied with a brush or spray gun and wiped in such manner as to leave it in the pores of the wood but clean on the surface.



news

WHAT'S DOING IN THE FIELD OF INDUSTRIAL EDUCATION

IN OBTAINING wood for making model planes for the Navy, schools should call the dealer's attention to the provisions of order *M-208*, page 2, which states that lumber for the model aircraft project has a priority rating of AA-2x.

A PRINTED bulletin, *Design of Combat Aircraft*, is available as long as the supply lasts, from the Office of War Information, Washington, D.C.

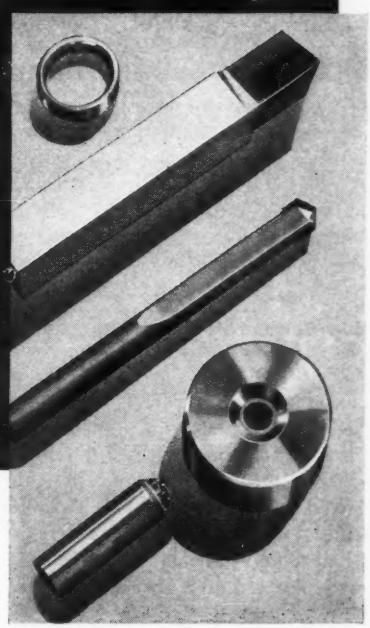
FINAL outlines of the first five pre-induction courses sponsored by the Army and the U. S. Office of Education are now being distributed to the schools of the country, which will carry on the program. These outlines cover courses in electricity, shopwork, machines, radio, and automechanics. Others are in preparation. Copies may be had from the Superintendent of Documents, Washington, D.C., for 10 cents.

Strictly Personal...

ABOUT YOUR FELLOW TEACHERS

E. G. ALLEN, principal of Cass Technical High School, Detroit, Mich., was recently honored by a resolution adopted by the Detroit Board of Commerce. The resolution reads: "The Detroit Board of Commerce appreciates the splendid educational service that Mr. Allen has rendered our community, and joins with his many friends, coworkers, and former students in honoring him." Mr. Allen became principal of Cass on the retirement of the late B. F. Comfort in 1937. . . . ANDREW H. WHITESITT, professor of industrial education at Kansas State Teachers College, Pittsburg, died following a heart attack on October 5. . . . MARTIN VAN SCHLEVEN has replaced IVAN WICKHAM as coordinator in the Grand Haven, Mich., schools. Mr. Wickham has resigned to become assistant superintendent in a local industrial plant. . . . NORMAN ERCKMAN is now teaching at Lincoln High School, Ferndale, Mich. He formerly taught at Technical High School, Atlanta, Ga. . . . ROLAND A. COX, supervisor of printing at the College of the Ozarks, Clarksville, Ark., is now supervisor of printing in the Salina, Kan., schools. . . . FRANKLIN H. THOMPSON, formerly of the Burris Laboratory School, Ball State Teachers College, Muncie, Ind., has taken up new duties as instructor in freshman engineering at Purdue University. . . . For the duration, the address of HOMER C. ROSE will be Teacher Trainer, Armored Force School, Fort Knox, Ky. He taught formerly at Southern Illinois Normal University, Carbondale. . . . 1942 marks the twentieth year of Dr. J. C. WRIGHT's services in charge of the federal vocational education program. He joined the Federal Board for Vocational Education in 1917 and has been director since 1922.

Use all 5 Ways to STEP UP War Production . . . With Carbides



1. Cut Metals Faster! . . . Carbide tools commonly double the volume of metal removed per hour. Cut wide range of material, from "tough" armor plate to "soft" plastics. Continuous or interrupted cuts. Adaptable to most old machines, as well as new. (Catalog GT-142.)

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3. Keep Machines Running! . . . Stop "shutdowns" caused by excessive wear on such parts as rollers, cams, guides, gages, valves, etc., used on your equipment. Just a small insert of carbide at the point of wear often increases life of parts up to 100 times longer. (Booklet WR-101.)

4. Draw Metals Better! . . . Draw, size, extrude your metals through carbide dies for better finish, greater accuracy, larger output, more continuous operation. Use for wire, bar, tubing, sheet metal. Outstanding for cartridge cases from .30 cal. through 105 mm. (Manual D-113.)

5. Install Equipment Quicker! . . . When installing new equipment, wiring and piping, or relocating present machines, carbide masonry drills drill holes 75% faster in concrete, brick, tile, porcelain, plaster. (Leaflet GT-103.)

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. . . news from INDUSTRY

For items listed in this column, readers may address the firm named or write to News from Industry Dept., SCHOOL SHOP, Box 100, Ann Arbor, Michigan.

Stanley Tools Introduces New Inspection Magnifier

To facilitate inspection work on small parts, Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., has introduced a new "Flud-

Lite" magnifier containing a built-in fluorescent light. Consisting of a large magnifying lens with light attached, the magnifier may be had in both bench-stand and hand models. It will be found useful for small-parts assembly, finding cracks and scratches, inspection of tools, etc.

'Chip Breaker Designs' Is New McKenna Bulletin

Chip Breaker Designs by W. L. Kennicott, engineer for McKenna Metals Co., Latrobe, Pa., is offered by McKenna as their bulletin number 442. The bulletin describes the correct types of chip-breakers and how to achieve them for various jobs. Copies of the folder may be had from McKenna Metals Co., 274 Lloyd Ave., Latrobe, Pa., or from SCHOOL SHOP.

Lafayette Radio Corp. Issues New Catalog

Lafayette Radio Corporation's new Catalog No. 87 lists radios, public address systems, and all radio parts, tubes, and accessories of value in radio instruction, particularly for pre-induction training. Listed also are tools, wire, cables, and reference books on radio work. Copies of the 128-page book may be had without charge from Lafayette Radio Corp., 901 W. Jackson Blvd., Chicago, or from SCHOOL SHOP.

Carboloy Announces Visual Aids on Carbides

To expedite the training of workers in the use of carbide cutting tools, Carboloy Company of Detroit has developed and is making available a series of six educational 35 mm. silent slide-films.

Strictly noncommercial in character, the films are designed for instructional purposes and are completely selfexplanatory. They are intended to enable users of carbide tools to increase production, save time, reduce tool costs and consumption by an understanding of the factors relating to their application. Much related information on carbide manufacture is included.

Subjects covered by the films are: What is Cemented Carbide?, Designing Carbide Tools, Brazing Carbide Tools, Chip Breakers, Grinding Carbide Tools, and Putting Carbide Tools to Work. Accompanying each film is a booklet reproducing the film for reference purposes and containing additional reference material, charts, etc.

The films are offered at print cost. Arrangements are also being made for free loaning of the films through film libraries maintained by colleges in many states.

Atlas Press Company Wins Army-Navy 'E'

The employees and management of Atlas Press Company, Kalamazoo, Mich., have been awarded the Army-Navy 'E' pennant as a symbol of their excellent production of machines needed in the war effort. Presentation was made on November 10.

Allied Radio Offers Radio Formulas and Data Book

Allied Radio Corporation, Chicago, announces the publication of a new handy pocket-sized handbook containing essential formulas and data used in radio and electronics work. Available for instant reference are formulas, data, and tables covering such subjects as Ohm's Law, inductance, reactance, impedance, resonance, use of exponents, trigonometric relationships, and mathematical symbols.

Although a price of 10 cents has been placed on the book, copies will be sent free to instructors, school officials, and libraries. Requests should be addressed, on school letterheads, to Allied Radio Corporation, Educational Dept., Room 101, 833 W. Jackson Blvd., Chicago.

Adjustable Clamp Co. Issues New Catalog

Jorgensen, *Mark*, and *Pony* clamps and fixtures are described and illustrated in the new 32-page Catalog No. 16 issued by Adjustable Clamp Co., 417 N. Ashland Ave., Chicago, Ill. A number of improvements are to be noted in the clamps listed, for example the adoption of "loose-bar" handles instead of wing nuts on *Jorgensen* body clamps. Copies of the catalog may be had from the manufacturer or from SCHOOL SHOP.

IN THE *Morning Mail...*

Brief comments about SCHOOL SHOP *and the field it serves are invited. Address the Editor,* SCHOOL SHOP, *Ann Arbor, Michigan.*

Arriving too late for publication in December's "question-of-the-month," Mr. HINDERMAN's answer to that question is printed herewith:

Junior high-school teachers of general shop and woodworking provide the following types of aviation activities in a very capable manner as a unit in their regular industrial arts courses:

1. Individual construction of flying stick gliders, flying stick and fuselage models, and simple solid scale model planes.
2. Group construction of a model to teach the principles involved in plane designing.
3. Building of experimental apparatus to test the forces acting on a plane in flight.

Senior high-school teachers find pupils are challenged by the following activities:

1. *Woodworking.* Mass production methods involved in solid scale model building. Full-scale glider construction that provides an opportunity to learn and apply principles of aerodynamics.
2. *Drafting.* A unit on airplane drawing which provides an understanding of modern plane manufacturing procedures.
3. *General Crafts.* Exploratory units based on courses in fabric, canvas, and leather; plexiglass and plastics; paint and dope given by our department of vocational education for the Air Service Command, Army Air Corps.
4. *General Metalwork.* Exploratory units based upon courses in aircraft sheet metal-work; machine shop; fuselage disassembly, etc., given at the request of the Air Service Command by our vocational school.

R. A. HINDERMAN,
Director of Research and Vocational Education, Denver, Colo., Public Schools.

Gentlemen:

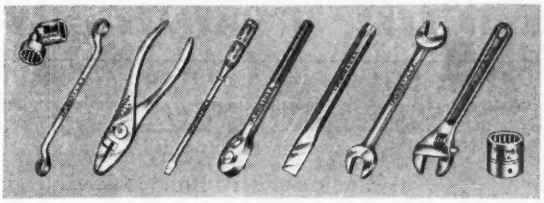
I wish to take this opportunity to thank you for your kindness and thoughtfulness in sending me SCHOOL SHOP. I enjoyed it very much and have kept every issue.

I have joined the armed forces and have just completed my training as a technical instructor in advanced aviation. I expect to be shipped to a base or an aircraft carrier any day now.

Again I wish to thank you for sending me SCHOOL SHOP, and when the war is over, I hope to be able to be placed on your mailing list again.

F. R. FERRIS, C. Sp.,
U. S. N. R.

Thanks for your kind words, reader Ferris and the best of luck.—*Ed.*



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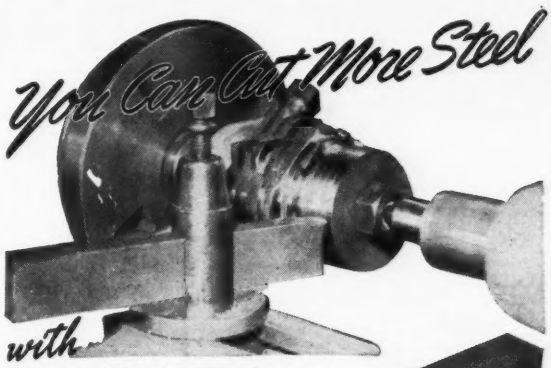

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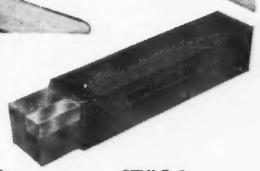

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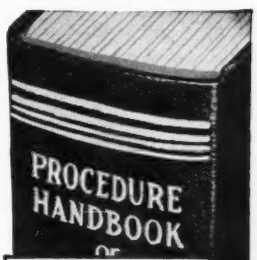

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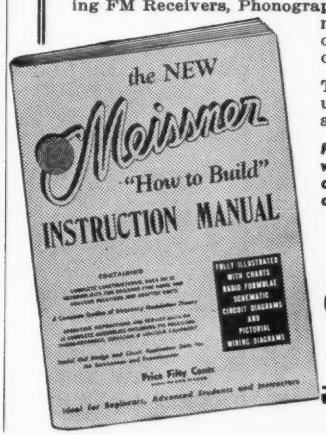
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instructional resources

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Right and Wrong in Milling Practice. Milwaukee: Kearney & Trecker Corp., 1942. Pp. 136. No charge to instructors.

Each page of this handy manual points out one *right* and *wrong* way of doing a specific milling technic, with emphasis on the right way. Each right-and-wrong way is illustrated with a simple drawing which pictures the point being made. Chapters deal with setting up the machine and the job, caring for cutters, safety, etc. Other books in the series, to be ready shortly, are:

The Milling Machine and Its Attachments, Elementary Milling Practice, and *Advanced Milling Practice.*

Radio Pocket Trouble-shooters. Ghirardi. New York: Radio & Technical Publishing Co., 1942. $0.50 each.

To use these gadgets, one for home radios, the other for auto radios, one locates the symptom as listed on the tabs at the top of each card in the *Troubleshooter.* By swinging this down and exposing the card for the tab chosen, the repair student sees the possible causes of the trouble opposite the list of the various parts of the radio, enabling him to find and correct the trouble in a minimum amount of time.

A. A. Ghirardi is author of *Radio Physics Course, Modern Radio Servicing,* and *Radio Troubleshooter's Handbook.*

Milling Machine Job Training Units. Chicago: American Technical Society, 1942. Pp. 110. $1.25.

Each job contains list of materials and tools, general instructions, operating steps, necessary sketches, precautions, questions, and references. Following each job is a check sheet where the student's accomplishment on the job may be checked through questions. Appendixes on blueprint reading, shop knowledge, instructor's demonstrations, and references. Separate folder of check-sheet answers.

This series of units was prepared and tested by members of the staff of Dunwoody Industrial Institute, Minneapolis.

Automotive Electrical Equipment. Crouse. New York: McGraw-Hill Book Co., 1942. Pp. 232. $2.00.

Chapters take up in turn all of the various components of the automotive electrical system: storage battery, cranking-motors, generator, horns, ignition, and so on. Both fundamentals and service operations are discussed. Service problems, for example, of Auto-Lite, Delco-Remy, and Ford regulators, too, are described. Illustrated with drawings and photos; index.

William H. Crouse is field service engineer of the Delco-Remy Division of General Motors Corporation, Anderson, Ind.

Radio Builder's Handbook. Chicago: Allied Radio Corp., 1942. Pp. 36. $0.10 (discount for quantities).

This manual takes up the construction of radio sets from the viewpoint of the amateur radio builder, discussing in turn diagrams and charts, types of circuits, symbols, tools, soldering, mounting the parts, etc. Some theoretical background material is also given, in simple, easily understood terms. Lists of abbreviations and references, radio code, conversion tables, and other helpful material are included.

Shop Mathematics at Work. Welton and Rogers. New York: Silver Burdett Co., 1942. Pp. iv + 204. $1.56 Wirebound.

This workbook-style text deals with the mathematics likely to be needed by the man on the job—common fractions, decimals, measurement, use of letters as numbers, equations, exponents, square root, formulas, ratio and proportion, geometic constructions, and right-triangle trigonometry. Following brief introductory material each unit contains problems to assist the student in grasping the principle involved. Tests on the content follow each unit. Cumulative review problems; appendix of tables and formulas; index.

Paul L. Welton is head of the department of mathematics and science, Jefferson High School, Rochester, N. Y. William W. Rogers is instructor in related technical subjects, Edison Technical and Industrial High School, Rochester.

Mechanical Drawing Including Blueprint Reading. Babbitt and Swartz. New York: Henry Holt and Co., 1942. Pp. iv + 217. $1.50.

Beginning with the preparation and use of materials of drafting, this text covers the use of the instruments, orthographic drawings, isometric drawings, blueprint reading, assembly drawings, scaled drawings, cylindrical work, sections and partial sections, developments, lettering, geometrical definitions and problems, and industrial sketching. Each chapter concludes with problems on the material discussed. Index.

Arthur B. Babbitt, president of the Kent Machine Co., Cuyahoga Falls, Ohio, formerly taught drawing at Hartford, Conn., Public High School. David J. Swartz is Chairman, Department of Mechanical Drawing, Haaren High School, New York.

New Catalog Lists Wiley Technical Books

Books on technology and science of interest to industrial education teachers are listed in a new catalog published by John Wiley & Sons, Inc., 440 Fourth Ave., New York. Titles listed deal with aeronautics, engineering, electricity, radio, mechanics, drafting, mathematics, and woodworking. The 102-page catalog is available at no charge on request to the publisher.

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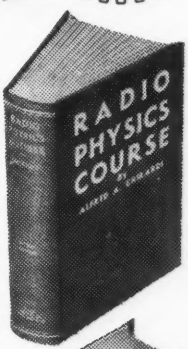

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What Do You Think?

How should textbooks be used in the school shop?

Says Prof. LEROY BREWINGTON, Department of Industrial Education, State Teachers College, Pittsburg, Kansas:

Textbooks should be used in the school shop much different than has been the practice of most schools in recent years. The school shop should have its own shop-housed library to supplement the prescribed text. This makes possible the maximum use of all books as they apply to the various fields for which they are written. Use the supplemental references and text only as the information contained therein has any immediate bearing or relationship to the current task or assignment.

Years of experience dealing with all ages in the school shop have taught that information alone is of no particular and lasting value unless it can be utilized immediately in the execution of some material job. Our leading educators in the field of industrial education and kindred fields of hand-executed tasks verify this statement. Functioning knowledge has its highest value when it reveals itself at the time it is needed.

Says Dr. STANLEY J. PAWELEK, Supervisor of Industrial Education, Baltimore, Md., schools:

Industrial arts teachers in both junior and senior high schools have long been "sold" on the idea of using textbooks in shop classes. Vocational shopwork teachers, as a group, have not been too enthusiastic. The reasons may be either that related subject teachers have carried the brunt of the so-called "book learning," or that shop teachers have not felt that they were well enough prepared to use textbooks effectively in their classes.

The following are some ways in which textbooks may be used:

1. To help prepare students for a demonstration.—The instructor desires to present a demonstration on "Centering a Piece of Stock in a Lathe." He requests that his students read about this operation in the textbook, and when the demonstration is given, it becomes much more meaningful to the class.

2. To emphasize and follow-up oral instructions.—Oral instructions become more effective when followed by an assignment in the textbook.

3. To provide the necessary related information.—A shop teacher is not always in a position to provide all of the related information necessary for the doing of a job. He may well request that his students study their textbooks to get this.

4. To furnish a guide for manipulative processes and to take care of individual differences.—Assignments dealing with manipulative processes help to take care of individual differences in speed and understanding of oral lessons or demonstrations. It will save the instructor's time to request slower or faster students to follow instructions in a textbook.

The textbook ought to be adapted to the course of study, and not vice versa. It is not a good procedure to follow a textbook, page by page. Very few texts "fit" every shop teaching situation. The point of view taken here suggests using the textbook as a guide or a "bible" for the subject matter presented.

Says C. E. WESTGATE, Woodwork Instructor, Stadium High School, Tacoma, Wash.:

My reply may surprise you. Books as course texts have been used here in the past, but we are not using them now. The manner of using them was similar to that used in any classroom, with assignments, reports, discussions, and tests. We use books now only for reference, the boys using them to look up projects, design, etc.

My reason for opposing textbooks in woodshop might be something like this: Boys take shop because they want to do things. It acts as a relief from regular classroom routine. In shop boys learn by doing, and if they do not do anything they do not learn anything. Boys generally have something they want to make and are greatly bored by shop recitations and tests. Our enrolment fell off so badly during the time we used textbooks here that the practice was discontinued. When I announced, a few years ago, that no textbooks would be used, I got a good round of applause, showing what the students thought of it.

No, I do not use textbooks in woodshop, and my opinion after having been on the job here for over 30 years is, that if you want to lose your enrolment, just make your shop a regular classroom.

Says JOHN A. HARTQUIST, Instructor of War Production Training Classes, St. Paul, Minn., Vocational School:

A half hour of group instruction each day in the classroom using the textbook as a reference, and showing and explaining the "why" and "how" of the different facts and formulas has proved itself of great value to me. Careful reading of his textbook, along with a more detailed explanation given by the instructor, gives the student a clearer perception of the job to be done. An interest in his work which he would not otherwise experience is thus created.

I have found that no matter how good an oral description or demonstration is given, the student is able to grasp the information a great deal better when he can have his textbook and read along with the instructor.

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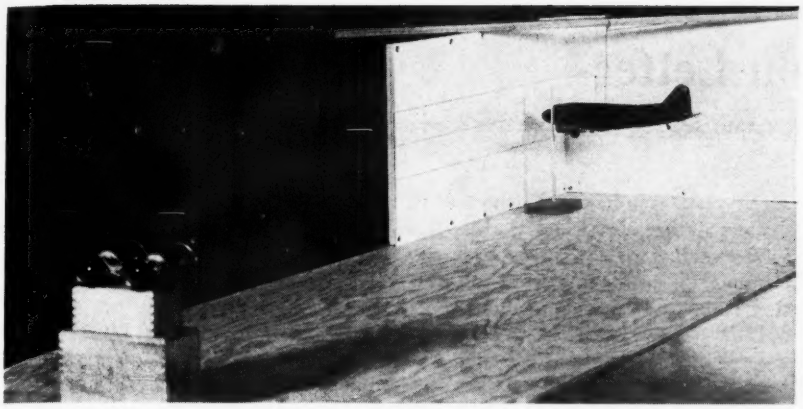


Balancing Device

FOR SCALE-MODEL AIRPLANES

BY *Alfred H. Ward*
OSSINING, N.Y., JR.-SR. HIGH SCHOOL

THE device illustrated here enables the student to maintain the same accuracy in balancing model planes for the Navy that he used in building it. It also shows the number of ⅛″ shims required under the high points of the plane while drilling, to maintain the balance indicated by this device.

The leveling boards are of ½ inch plywood, on which bristol board with the leveling lines is mounted. These boards are mounted at right angles.

The suspension arm in figure 2 is of hardwood, ½″ x 1″ x 33″. Round the arrises on the four sides to conform to each corner of the sliding bridle, which is of soft wire (see detail) and should slide freely over the arm.

The device must be perfectly level, using the leveling lines on the boards as guides; fasten the boards down to prevent moving. Opera glasses, which can easily be obtained, are mounted at the other end of the base with the center of the glasses directly on the center line of the leveling boards. Balance of the plane, suspended by pin and thread from arm, can now be checked through these glasses, the pin being moved until perfect balance is achieved. The dowel is used to keep the plane from swinging.

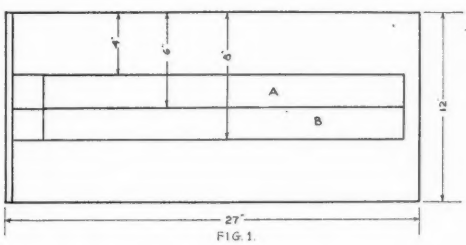
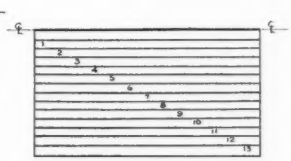


FIG. 1.


DETAIL for AREAS A & B
RULE ALTERNATE RED & BLACK LINES ⅛ INCH APART STARTING AT BLACK CENTER LINE • • • NUMBER AS SHOWN •• RED FIGURES FOR RED LINES BLACK FIGURES FOR BLACK LINES.

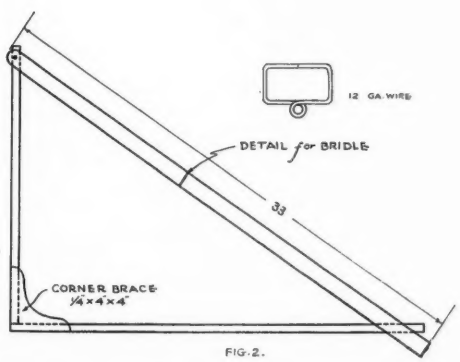


FIG. 2.

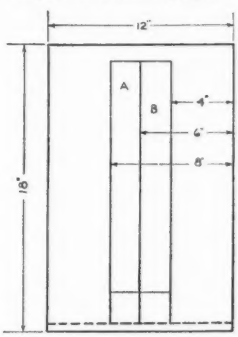


FIG. 3.

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- ☐ Indirect Table Lamp Standard
- ☐ Laminated Mint Tray
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Washington Letter

FIRST job facing Dr. W. W. Charters, newly appointed federal overseer of all vocational training programs, is how to fill the half-empty preemployment training centers.

Of the four programs under his wing —Vocational Training, NYA, Training Within Industry, and Apprenticeship— the first two will give him the biggest headaches. Among his initial acts as chief of the Training Division of the Manpower Commission, Dr. Charters issued a call for at least 300,000 new trainees for preemployment classes. At present these courses enroll not more than 160,000 persons. How Dr. Charters hopes to obtain additional trainees is not known yet. As this letter goes to press, he is "in the field" and is "studying the situation," federalese jargon for saying that he has not yet sunk his teeth into the job.

Dr. Charters' strategy may be to appeal to the employer not to hire untrained recruits. He may use as his argument the fact that untrained labor is unstable; that its turnover is 50 percent greater than labor which has gone through the sifting incident to training.

Or, he may be successful in opening up more training classes to Negroes, who in many parts of the country are knocking unsuccessfully at the doors of training schools. He may find ways to bring more women into the classes. For, when Mr. McNutt gave Dr. Charters his job he told him: "You will be expected to see to it that training is provided for the older as well as for the young men and women, regardless of race, or national origin."

● Second battle confronting the new chief of the Training Division is what to do with the National Youth Administration. Encouraged by the fact that at least two New Deal agencies have died—CCC and WPA—some Congressmen are now gunning anew for the NYA. The sub-committee of the House Appropriations Committee which holds NYA purse strings has voted tentatively to "liquidate" NYA by June, 1943, unless the President scuttles it before.

While opponents of NYA continue to accuse the youth agency of "boondoggling," friends of the NYA cite these figures: In a typical month (November) the NYA was training 16,736 in machine shop; 1,150 in aircraft sheetmetal; 6,756 in other sheetmetal work; 9,650 in arcwelding; 1,438 in aircraft mechanics; 788 in foundry work—to mention only a few war occupations.

If Dr. Charters decides to go to the defense of the NYA he will have a very busy—and scrappy—1943!

● "When we come out of this war, I think the federal government will be at the top; second, organized labor . . .," writes E. C. Lindeman in the December *Journal of the NEA*, predicting the shift of power in the post-war world. Whether we agree or not, organized labor has had and will have considerable influence on vocational and industrial education. Your reporter therefore left the bustling offices of the Manpower Commission and strolled over to the (relatively) quiet Northwest Washington where are located the offices of the American Federation of Labor and the Congress of Industrial Organization. "What about vocational training?" we put the question to each group.

Younger, more politically-minded, the CIO has little to say about vocational training as a long-range educational problem. It is concerned primarily with the war and manpower. It accuses the manpower agency of being a fire department emergency squad—to be rushed in to an area of manpower crisis. It urges labor-government-management action (with equal power to the three arms) which would consider training as part of manpower needs.

The American Federation of Labor has been studying vocational education problems since 1908. It has supported the Smith-Hughes, George-Deen and other measures promoting vocational education. Its officials therefore feel that they have a right to speak with some authority.

First a kind word: "The AFL and the Office of Education are agreed that vocational education in local communities should be established on the basis of actual need and only upon the advice of a representative advisory committee." The AFL has urged its central bodies and local unions to help set up such "democratic advisory committees."

But here are some sharper words: "A major mistake of vocational education teachers has been their efforts to build up huge industrial facilities in schools and thus take training out of workshops and factories, instead of leaving work training in the industrial environment and supplementing it with instruction in the school. The war has again shown the superiority of work training on the job, with additional related instruction in schools. Under any other type of organization school training remains pre-vocational."

● While Washington's chief interest centers on Manpower Czar McNutt and the manner in which he will use his vast manpower and vocational education powers, another development is also being watched:

There is the promise of the technical bookpublishing industry to produce "shelf upon shelf" of technical texts by February, for pre-induction as well as for many another training program. The war had caught the Nation's schools, libraries, and bookstores with meager supplies of technical texts. But the publishing industry has risen to the occasion with great energy and intelligence, Washington officials say, in turning out rapidly much-needed instructional material. But thousands more volumes are needed for the Army, Navy, Civil Aeronautics Authority, Engineering Science Management War Training, and other programs. Washington is expecting the publishing industry to take seriously the slogan: "Technical books are weapons of war."

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HOW TO GET THE MOST OUT OF YOUR LATHES

No. 3 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production

Keep Your Lathes Level

The leveling of a lathe can either perpetuate or destroy the best craftsmanship of the machine tool builder. A lathe that is not kept perfectly level cannot turn out the precision work for which it was built.

The lathe bed is comparable to a toolmaker's surface plate. Upon it rest the headstock, carriage and tailstock. Therefore, any twisting of the lathe bed will throw the headstock, tailstock and carriage out of alignment. This will cause the lathe to turn or bore a taper instead of taking a straight cut. It will also cause the alignment of the tailstock center point to shift as the tailstock is moved along the lathe bed, necessitating constant readjustment of the tailstock top set-over.

Every lathe should be checked periodically to see that it is level

Check Leveling Frequently

The major cause of distortion in lathe beds is the settling of the floor supporting the lathe. This is most commonly encountered in buildings that do not have solid foundations or that have wooden floors or columns. There are numerous other conditions which can cause this, such as the shifting of loads on the floor, swelling of wood flooring, deterioration of wooden shims, and atmospheric changes. For these reasons, every lathe should be checked periodically to see that it is level.

How to Level a Lathe

The first requisite for accurate leveling is a precision level at least 12″ long. One that is sufficiently sensitive to show a distinct movement of the bubble when a .003″ shim is placed under one end of it. A carpenter's level, a combination square level, or an ordinary machinist's level cannot be used because they are not sufficiently sensitive.

The leveling of the lathe is tested by placing the level squarely across the lathe bed, immediately in front of the headstock, and also at the extreme right end of the bed. On lathes having long beds, tests should also be made at one or more intermediate positions. Be sure that the ways are wiped perfectly clean of all chips or dirt before using the level.

Metal shims should be used under the lathe at the points indicated by the level as being low. Some lathes are equipped with leveling screws making it unnecessary to use shims.

After all adjustments have been made, bolt the lathe securely to the floor and repeat the tests to make sure that tightening the leg bolts has not affected the leveling of the lathe.

Alignment Test

A simple alignment test can be used to check the leveling of a lathe. Place a bar of steel, one inch or larger in diameter, in the chuck and machine two collars of equal diameter three or four inches apart. Then, take a very light finishing cut across both collars without changing the setting of the cutter bit. Measure both collars with a micrometer. If the collars are not the same diameter, it is an indication that the lathe is not level. Adjust the leveling until, when a cut is taken, both collars are turned the same diameter.

Write for Bulletin H3

Bulletin H3 giving more detailed information on the installation and leveling of lathes will be supplied on request. Also reprints of this and other* advertisements and bulletins in this series. State quantity.

*Ad. No. 1, "Keep Your Lathe Clean"
Bulletin H1, "Keep Your Lathe Clean"

Ad. No. 2, "Oiling the Lathe"
Bulletin H2, "Oiling the Lathe"

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